Z68A-G43 (G3)/ Z68S-G43 (G3) series

MS-7750 (v1.x) Mainboard

G52-77501X8

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Revision History

Revision	Revision History	Date
V1.0	First release for PCB 1.X	2011/ 06
V1.1	Update release for PCB 1.X	2011/ 08

Technical Support

If a problem arises with your system and no solution can be obtained from the user's manual, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

- Visit the MSI website for technical guide, BIOS updates, driver updates, and other information: ***http://www.msi.com/service/download***
- Contact our technical staff at: ***http://support.msi.com***

Safety Instructions

- Always read the safety instructions carefully.
- Keep this User's Manual for future reference.
- Keep this equipment away from humidity.
- Lay this equipment on a reliable flat surface before setting it up.
- The openings on the enclosure are for air convection hence protects the equipment from overheating. DO NOT COVER THE OPENINGS.
- Make sure the voltage of the power source is at 110/220V before connecting the equipment to the power inlet.
- Place the power cord such a way that people can not step on it. Do not place anything over the power cord.
- Always Unplug the Power Cord before inserting any add-on card or module.
- All cautions and warnings on the equipment should be noted.
- Never pour any liquid into the opening that can cause damage or cause electrical shock.
- If any of the following situations arises, get the equipment checked by service personnel:
  - The power cord or plug is damaged.
  - Liquid has penetrated into the equipment.
  - The equipment has been exposed to moisture.
  - The equipment does not work well or you can not get it work according to User's Manual.
  - The equipment has been dropped and damaged.
  - The equipment has obvious sign of breakage.
- DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT ABOVE 60°C (140°F), IT MAY DAMAGE THE EQUIPMENT.

FCC-B Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the measures listed below.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Notice 1

The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Notice 2

Shielded interface cables and A.C. power cord, if any, must be used in order to comply with the emission limits.

VOIR LA NOTICE D'INSTALLATION AVANT DE RACCORDER AU RESEAU.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and
2) this device must accept any interference received, including interference that may cause undesired operation.

Battery Information

European Union:

Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat them in compliance with the local regulations.

Taiwan:

For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

廢電池請回收

California, USA:

The button cell battery may contain perchlorate material and requires special handling when recycled or disposed of in California.

For further information please visit:

http://www.dtsc.ca.gov/hazardouswaste/perchlorate/

CAUTION: There is a risk of explosion, if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.

Chemical Substances Information

In compliance with chemical substances regulations, such as the EU REACH Regulation (Regulation EC No. 1907/2006 of the European Parliament and the Council), MSI provides the information of chemical substances in products at:

http://www.msi.com/html/popup/csr/evmtprtt_pcm.html

BSMI EMI 聲明

警告使用者:

這是甲類資訊產品，在居住的環境中使用時，可能會造成無線電干擾，在這種情況下，使用者會被要求採取某些適當的對策。

WEEE (Waste Electrical and Electronic Equipment) Statement

ENGLISH

To protect the global environment and as an environmentalist, MSI must remind you that...

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical and electronic equipment" cannot be discarded as municipal wastes anymore, and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

DEUTSCH

Hinweis von MSI zur Erhaltung und Schutz unserer Umwelt

Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. MSI hat europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

FRANÇAIS

En tant qu'écologiste et afin de protéger l'environnement, MSI tient à rappeler ceci...

Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. MSI prendra en compte cette exigence relative au retour des produits en fin de vie au sein de la communauté européenne. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

РУССКИЙ

Компания MSI предпринимает активные действия по защите окружающей среды, поэтому напоминаем вам, что....

В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы. MSI обязуется соблюдать требования по приему продукции, проданной под маркой MSI на территории ЕС, в переработку по окончании срока службы. Вы можете вернуть эти изделия в специализированные пункты приема.

ESPAÑOL

MSI como empresa comprometida con la protección del medio ambiente, recomienda:

Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como “eléctricos y equipos electrónicos” no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al termino de su período de vida. MSI estará comprometido con los términos de recogida de sus productos vendidos en la Unión Europea al final de su periodo de vida. Usted debe depositar estos productos en el punto limpio establecido por el ayuntamiento de su localidad o entregar a una empresa autorizada para la recogida de estos residuos.

NEDERLANDS

Om het milieu te beschermen, wil MSI u eraan herinneren dat….

De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Electrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet meer beschouwd worden als vervuiling. Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus. MSI zal overeenkomstig de richtlijn handelen voor de producten die de merknaam MSI dragen en verkocht zijn in de EU. Deze goederen kunnen geretourneerd worden op lokale inzamelingspunten.

SRPSKI

Da bi zaštitili prirodnu sredinu, i kao preduzeće koje vodi računa o okolini i prirodnoj sredini, MSI mora da vas podesti da…

Po Direktivi Evropske unije (“EU”) o odbačenoj ekektronskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod “elektronsku i električnu opremu” ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja. MSI će poštovati zahtev o preuzimanju ovakvih proizvoda kojima je istekao vek trajanja, koji imaju MSI oznaku i koji su prodati u EU. Ove proizvode možete vratiti na lokalnim mestima za prikupljanje.

POLSKI

Aby chronić nasze środowisko naturalne oraz jako firma dbająca o ekologię, MSI przypomina, że...

Zgodnie z Dyrektywą Unii Europejskiej (“UE”) dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. “produkty oraz wyposażenie elektryczne i elektroniczne “ nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia. MSI wypełni wymagania UE, przyjmując produkty (sprzedawane na terenie Unii Europejskiej) wycofywane z użycia. Produkty MSI będzie można zwracać w wyznaczonych punktach zbiorczych.

TÜRKÇE

Çevreci özelliğiyle bilinen MSI dünyada çevreyi korumak için hatırlatır:

Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektonik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır. Avrupa Birliği'ne satılan MSI markalı ürünlerin kullanım süreleri bittiğinde MSI ürünlerin geri alınması isteği ile işbirliği içerisinde olacaktır. Ürünlerinizi yerel toplama noktalarına bırakabilirsiniz.

ČESKY

Záleží nám na ochraně životního prostředí - společnost MSI upozorňuje...

Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti. Společnost MSI splní požadavky na odebírání výrobků značky MSI, prodávaných v zemích EU, po skončení jejich životnosti. Tyto výrobky můžete odevzdat v místních sběrnách.

MAGYAR

Annak érdekében, hogy környezetünket megvédjük, illetve környezetvédőként fellépve az MSI emlékezteti Önt, hogy ...

Az Európai Unió („EU") 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetőek lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén. Az MSI betartja a termékvisszavétellel kapcsolatos követelményeket az MSI márkanév alatt az EU-n belül értékesített termékek esetében, azok élettartamának végén. Az ilyen termékeket a legközelebbi gyűjtőhelyre viheti.

ITALIANO

Per proteggere l'ambiente, MSI, da sempre amica della natura, ti ricorda che….

In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita. MSI si adeguerà a tale Direttiva ritirando tutti i prodotti marchiati MSI che sono stati venduti all'interno dell'Unione Europea alla fine del loro ciclo di vita. È possibile portare i prodotti nel più vicino punto di raccolta

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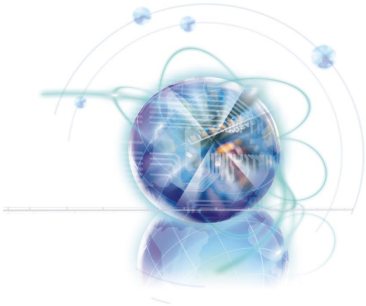


Chapter 1

Getting Started

Thank you for choosing the **Z68A-G43 (G3)/ Z68S-G43 (G3)** Series (MS-7750 v1.X) ATX mainboard. The Series mainboards are based on **Intel® Z68** chipset for optimal system efficiency. Designed to fit the advanced **Intel® LGA1155** processor, the Series mainboards deliver a high performance and professional desktop platform solution.

Packing Contents

Mainboard

Driver / Utility DVD

User Guide

Back IO Shield

SATA Cable

Optional Accessories

USB 2.0 Bracket

USB 3.0 Bracket

S/PDIF Out Bracket

SATA Power Cable

CrossFire Cable

M-Connector

* These pictures are for reference only and may vary without notice.

* The packing contents may vary according to the model you purchased.

* If you need to purchase the optional accessories or request part numbers, please visit the MSI website at http://www.msi.com/index.php or consult the dealer.

Assembly Precautions

- The components included in this package are prone to damage from electrostatic discharge (ESD). Please adhere to the following instructions to ensure successful computer assembly.
- Always turn off the power supply and unplug the power cord from the power outlet before installing or removing any computer component.
- Ensure that all components are securely connected. Loose connections may cause the computer to not recognize a component or fail to start.
- Hold the mainboard by the edges to avoid touching sensitive components.
- It is recommended to wear an electrostatic discharge (ESD) wrist strap when handling the mainboard to prevent electrostatic damage. If an ESD wrist strap is not available, discharge yourself of static electricity by touching another metal object before handling the mainboard.
- Store the mainboard in an electrostatic shielding container or on an antistatic pad whenever the mainboard is not installed.
- Before turning on the computer, ensure that there are no loose screws or metal components on the mainboard or anywhere within the computer case.
- Do not use the computer in a high-temperature environment.
- Do not boot the computer before installation is completed. This could cause permanent damage to the components as well as injury to the user.
- If you need help during any installation step, please consult a certified computer technician.

Important

A screwdriver (not included) may be required for computer assembly.

Mainboard Specifications

Processor Support

- Intel® Core™ i7/ Core™ i5 /Core™ i3/ Pentium®/ Celeron® processors for the LGA1155 package
  (For the latest information about CPU, please visit http://www.msi.com/service/cpu-support)

Chipset

- Intel® Z68 (B3) chipset

Memory Support

- 4x DDR3 DIMMs support DDR3 2133*(OC)/ 1866*(OC)/ 1600*(OC)/ 1333/ 1066 DRAM (32GB Max)
- Supports Dual-Channel mode
  (*OC = OverClocking, for more information on compatible components, please visit http://www.msi.com/service/test-report)

LAN

- Supports LAN 10/100/1000 Fast Ethernet by Realtek® RTL8111E

Audio

- Integrated HD audio codec by Realtek® ALC887
- 8-channel audio with jack sensing

SATA

- 2x SATA 6Gb/s ports (SATA1~2) by Intel® Z68
- 4x SATA 3Gb/s ports (SATA3~6) by Intel® Z68

RAID

- SATA1~6 support Intel® Rapid Storage Technology (AHCI/ RAID 0/ 1/ 5/ 10) by Intel® Z68
- Supports SSD caching for system acceleration

USB 3.0 (Z68A-G43 (G3))

- 2x USB 3.0 rear IO ports by NEC D720200

Multi-GPU

- Supports ATI® CrossFireX™ Technology
- Supports Lucid® VIRTU Technology

Connectors

- Back panel
  - 1x PS/2 keyboard port
  - 1x PS/2 mouse port
  - 2x USB 3.0 ports & 4x USB 2.0 ports (Z68A-G43 (G3))
  - 6x USB 2.0 ports (Z68S-G43 (G3))
  - 1x LAN port
  - 1x VGA port **
  - 1x DVI-D port **
  - 6x audio ports (Z68A-G43 (G3))
  - 3x audio ports (Z68S-G43 (G3))***

  **(The VGA and DVI-D ports only work with the CPU's Integrated Graphics Processor)

  ***(To reach the 8-channel sound effect, the 7th and 8th channels must be outputted from front panel.)
- On-Board
  - 4x USB 2.0 connectors
  - 1x Chassis Intrusion connector
  - 1x S/PDIF-Out connector
  - 1x Front Panel Audio connector
  - 1x TPM Module connector (optional)
  - 1x Parallel connector
  - 1x Serial connector

Slots

- 1x PCIe 3.0 x16 slot (PCI_E2)
- 1x PCIe 2.0 x16 slot (PCI_E4, it supports up to x4 speed)
- 2x PCIe 2.0 x1 slots
  - Only 1x PCIe x1 (PCI_E1 or PCI_E3) slot can be used at a time due to chipset bandwidth limitation. Using the PCI_E1 slot is recommended.
- 3x PCI slots

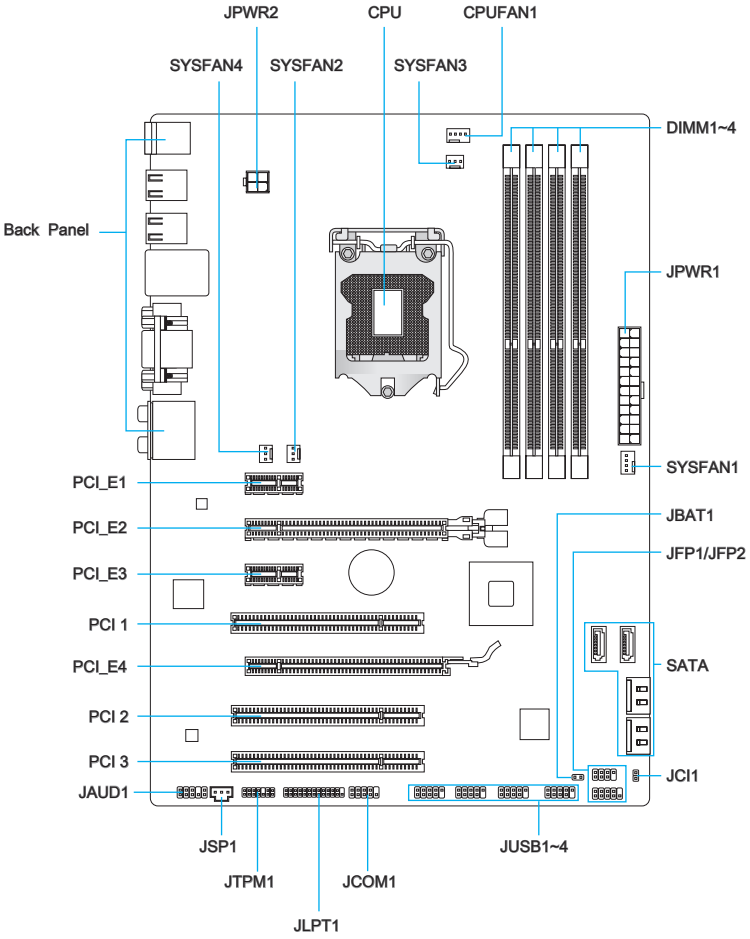
Form Factor

- ATX (22.0 cm X 30.5 cm)

Mounting Screw Holes

- 6x mounting holes

Connectors Quick Guide



Connectors Reference Guide

Port Type	Port Name	Page
LGA 1155 CPU Socket	CPU	1-10
ATX 24-pin Power Connector	JPWR1	1-15
ATX 4-pin Power Connector	JPWR2	1-15
DDR3 Memory Slots	DIMM1~4	1-16
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Chassis Intrusion Connector	JCI1	1-26
TPM Module connector	JTPM1	1-26
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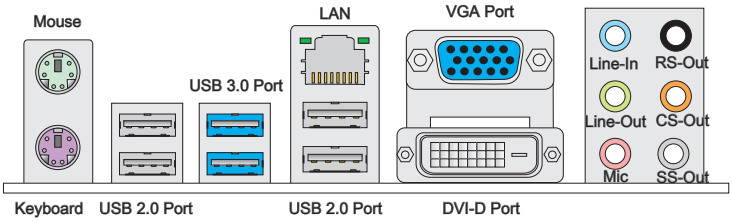
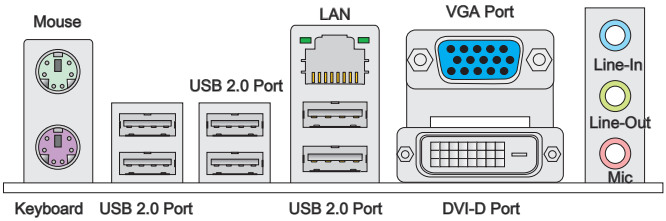
Back Panel Quick Guide

Z68A-G43 (G3)



Z68S-G43 (G3)



▸**Mouse/Keyboard**

The standard PS/2® mouse/keyboard DIN connector is for a PS/2® mouse/keyboard.

▸**USB 2.0 Port**

The USB 2.0 port is for attaching USB 2.0 devices such as keyboard, mouse, or other USB 2.0-compatible devices.

▸**USB 3.0 Port (optional)**

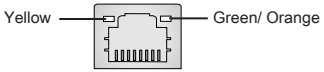
USB 3.0 port is backward-compatible with USB 2.0 devices. It supports data transfer rate up to 5 Gbit/s (SuperSpeed).

Important

In order to use USB 3.0 devices, you must connect to a USB 3.0 port. If a USB cable is used, it must be USB 3.0 compliant.

▸LAN

The standard RJ-45 LAN jack is for connecting to a Local Area Network (LAN).



LED	Color	LED State	Condition
Left	Yellow	Off	LAN link is not established.
		On(Steady)	LAN link is established.
		On(flashing)	The computer is communicating with another computer on the network.
Right	Green	Off	10 Mbits/sec data rate
		On	100 Mbits/sec data rate
	Orange	On	1000 Mbits/sec data rate

▸VGA Port

The DB15-pin female connector is provided for monitor.

▸DVI-D Port

The DVI-D (Digital Visual Interface- Digital) connector can be connected to a LCD monitor. To connect a monitor, please refer to the monitor's manual for more information.

Important

The VGA and DVI-D display ports are designed to be used by the Integrated Graphics Processor (IGP). If the processor installed does not provide integrated graphics, these display ports will not function.

▸Audio Ports

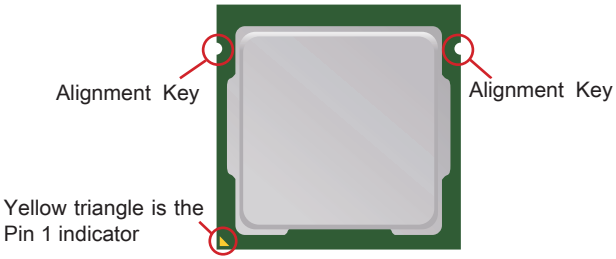
These connectors are used for audio devices. The color of the jack refers to the function of the connector.

- Blue-Line in: Used for connecting external audio outputting devices.
- Green- Line out: Used as a connector for speakers or headphone.
- Pink- Mic: Used as a connector for a microphone.
- Black- RS-Out (optional): Rear surround sound line out in 4/ 5.1/ 7.1 channel mode.
- Orange- CS-Out (optional): Center/ subwoofer line out in 5.1/ 7.1 channel mode.
- Gray- SS-Out (optional): Side surround sound line out in 7.1 channel mode.

CPU (Central Processing Unit)

Introduction to the LGA 1155 CPU

The surface of the LGA 1155 CPU has two alignment keys and a yellow triangle to assist in correctly lining up the CPU for mainboard placement. The yellow triangle is the Pin 1 indicator.



Important

Overheating

Overheating can seriously damage the CPU and mainboard. Always make sure the cooling fans work properly to protect the CPU from overheating. Be sure to apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.

Replacing the CPU

When replacing the CPU, always turn off the system's power supply and unplug the power supply's power cord to ensure the safety of the CPU.

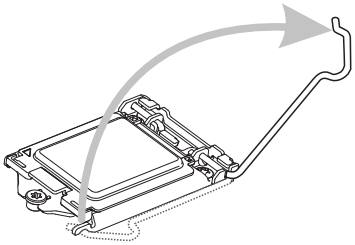
Overclocking

This mainboard is designed to support overclocking. Before attempting to overclock, please make sure that all other system components can tolerate overclocking. Any attempt to operate beyond product specifications is not recommend. MSI does not guarantee the damages or risks caused by inadequate operation beyond product specifications.

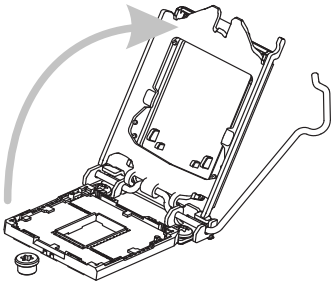
CPU & Cooler Installation

When installing a CPU, always remember to install a CPU cooler. A CPU cooler is necessary to prevent overheating and maintain system stability. Follow the steps below to ensure correct CPU and CPU cooler installation. Wrong installation can damage both the CPU and the mainboard.

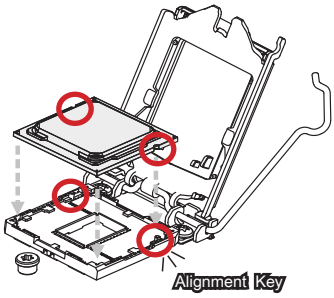
1. Unhook and lift the loading lever to the fully open position.



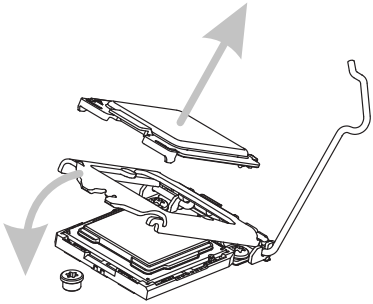
2. The loading plate should automatically lift up as the loading lever is pushed to the fully open position. **Do not touch any of the CPU socket pins.**



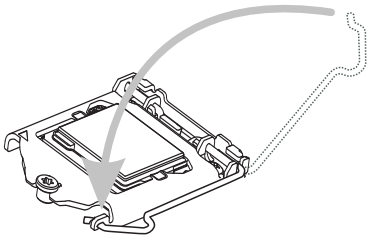
3. Line up the CPU to fit the CPU socket. Be sure to hold the CPU by the base with the metal contacts facing downward. The alignment keys on the CPU will line up with the edges of the CPU socket to ensure a correct fit.



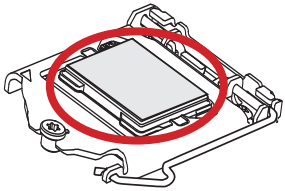
4. Close the loading plate and remove the plastic protective cap.



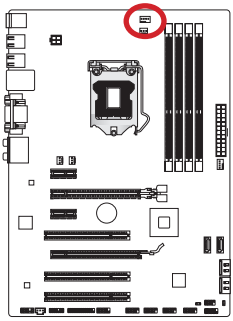
5. Inspect the CPU to check if it is properly seated in the socket. Press the loading lever down and lock it under the retention tab.



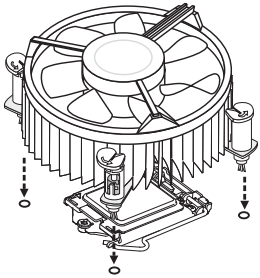
6. Evenly spread a thin layer of thermal paste (or thermal tape) on the top of the CPU. This will help in heat dissipation and prevent CPU overheating.



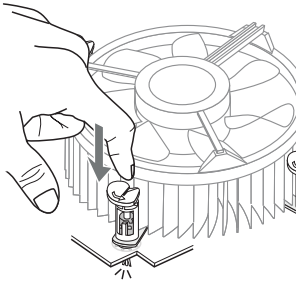
7. Locate the CPU fan connector on the mainboard.



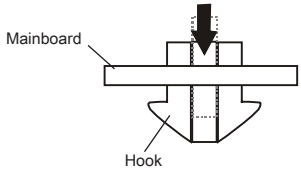
8. Place the heatsink on the mainboard with the fan's wires facing towards the fan connector and the hooks matching the holes on the mainboard.



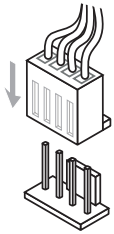
9. Push down on the heatsink until the four clips get wedged into the holes on the mainboard. Press the four hooks down to fasten the cooler. As each hook locks into position a click should be heard.



10. Inspect the mainboard to ensure that the clip-ends have been properly locked in place.



11. Finally, attach the CPU fan cable to the CPU fan connector on the mainboard.

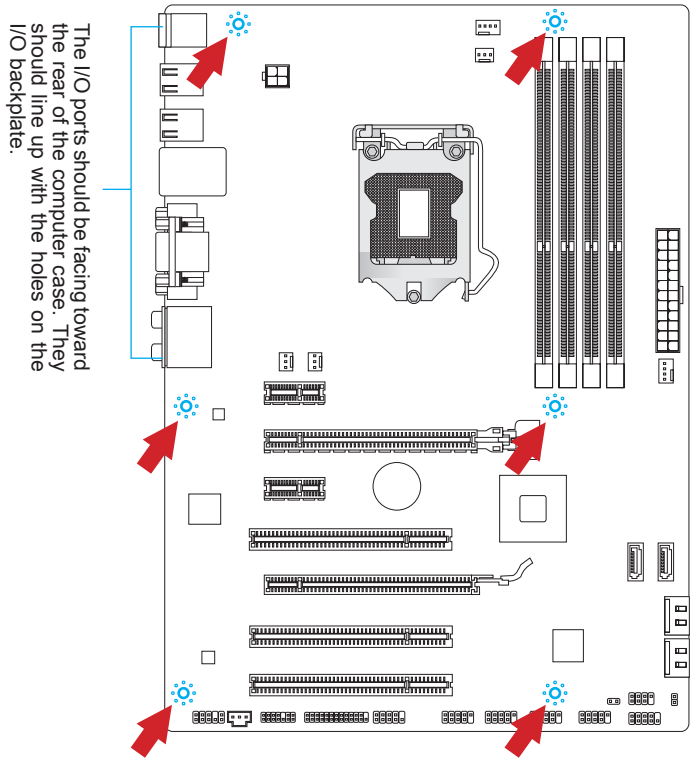


Important

- *Do not touch the CPU socket pins.*
- *Confirm that the CPU cooler has formed a tight seal with the CPU before booting your system.*
- *Whenever the CPU is not installed, always protect the CPU socket pins by covering the socket with the plastic cap.*
- *Please refer to the documentation in the CPU cooler package for more details about CPU cooler installation.*

Mounting Screw Holes

When installing the mainboard, first install the necessary mounting stands required for a mainboard on the mounting plate in your computer case. If there is an I/O back plate that came with the computer case, please replace it with the I/O backplate that came with the mainboard package. The I/O backplate should snap easily into the computer case without the need for any screws. Align the mounting plate's mounting stands with the screw holes on the mainboard and secure the mainboard with the screws provided with your computer case. The locations of the screw holes on the mainboard are shown below. For more information, please refer to the manual that came with the computer case.



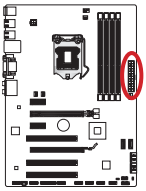
Important

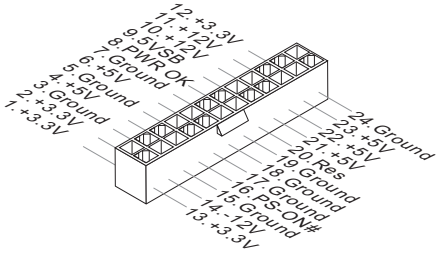
- *Install the mainboard on a flat surface free from unnecessary debris.*
- *To prevent damage to the mainboard, any contact between the mainboard circuitry and the computer case, except for the mounting stands, is prohibited.*
- *Please make sure there are no loose metal components on the mainboard or within the computer case that may cause a short circuit of the mainboard.*

Power Supply

ATX 24-pin Power Connector: JPWR1

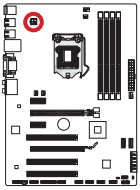
This connector allows you to connect an ATX 24-pin power supply. To connect the ATX 24-pin power supply, align the power supply cable with the connector and firmly press the cable into the connector. If done correctly, the clip on the power cable should be hooked on the mainboard's power connector.

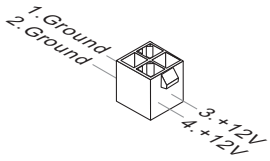




ATX 4-pin Power Connector: JPWR2

This connector provides 12V power to the CPU.



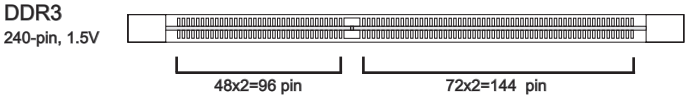


Important

Make sure that all the power cables are securely connected to a proper ATX power supply to ensure stable operation of the mainboard.

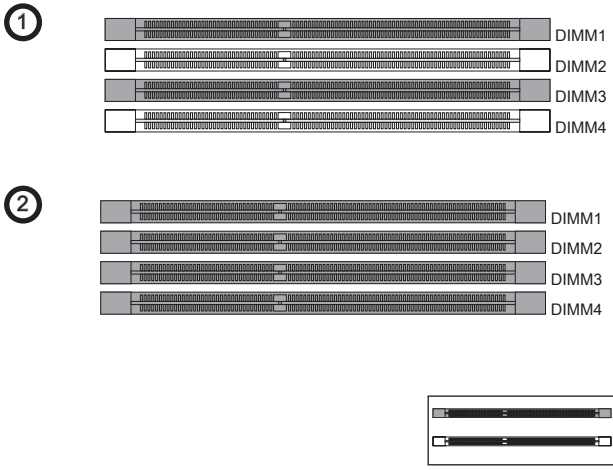
Memory

These DIMM slots are used for installing memory modules. For more information on compatible components, please visit http://www.msi.com/service/test-report



Dual-Channel mode Population Rule

In Dual-Channel mode, the memory modules can transmit and receive data with two data bus channels simultaneously. Enabling Dual-Channel mode can enhance system performance. The following illustrations explain the population rules for Dual-Channel mode.

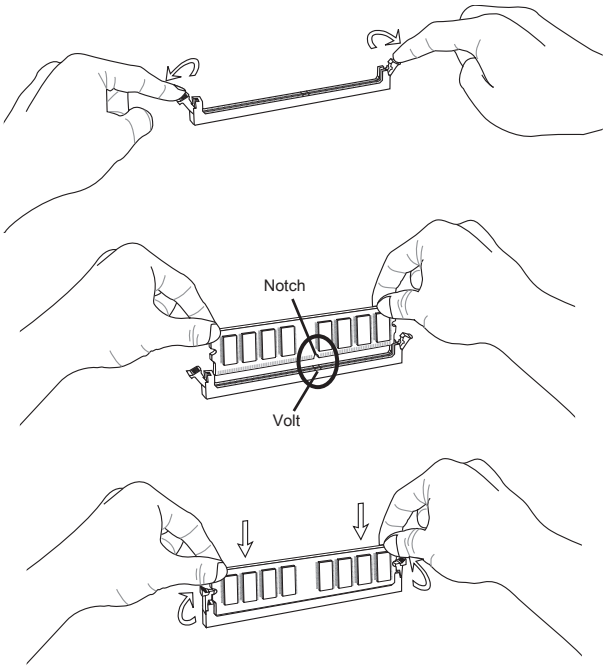


Important

- *DDR3 memory modules are not interchangeable with DDR2, and the DDR3 standard is not backward compatible. Always install DDR3 memory modules in DDR3 DIMM slots.*
- *To ensure system stability, memory modules must be of the same type and density in Dual-Channel mode.*
- *Always insert memory modules in the DIMM1 slot first.*
- *Due to chipset resource usage, the system will only detect up to 31+ GB of memory (not full 32 GB) when all DIMM slots have 8GB memory modules installed.*

Installing Memory Modules

1. Unlock the DIMM slot by pushing the mounting clips to the side. Vertically insert the memory module into the DIMM slot. The memory module has an off-center notch on the bottom that will only allow it to fit one way into the DIMM slot.
2. Push the memory module deep into the DIMM slot. The plastic clips at each side of the DIMM slot will automatically close when the memory module is properly seated and an audible click should be heard.
3. Manually check if the memory module has been locked in place by the DIMM slot's side clips.

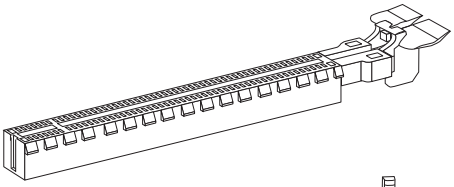


Expansion Slots

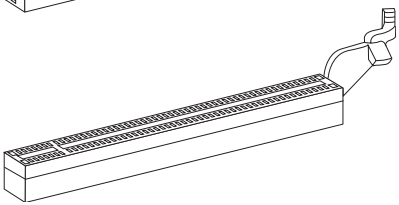
This mainboard contains numerous ports for expansion cards, such as discrete graphics or audio cards.

PCIe (Peripheral Component Interconnect Express) Slot

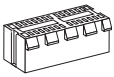
The PCIe slot supports the PCIe interface expansion card.



PCIe 3.0 x16 Slot



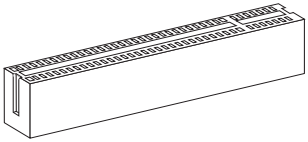
PCIe 2.0 x16 Slot



PCIe x1 Slot

PCI (Peripheral Component Interconnect) Slot

The PCI slot supports additional LAN, SCSI, USB, and other add-on cards that comply with PCI specifications.



32-bit PCI Slot

Important

When adding or removing expansion cards, always turn off the power supply and unplug the power supply power cable from the power outlet. Read the expansion card's documentation to check for any necessary additional hardware or software changes.

PCI Interrupt Request Routing

IRQ, or interrupt request lines, are hardware lines over which devices can send interrupt requests to the processor. The PCI IRQ pins are typically connected to the PCI bus pins as followed:

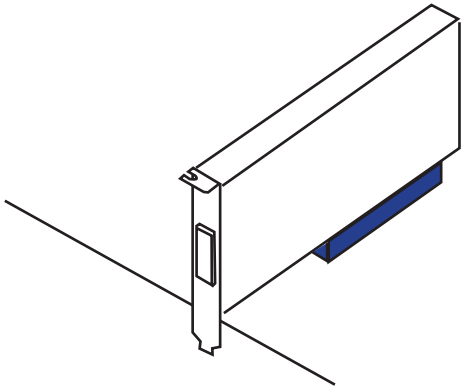
	Order1	Order2	Order3	Order4
PCI Slot1	INT A#	INT B#	INT C#	INT D#
PCI Slot2	INT B#	INT C#	INT D#	INT A#
PCI Slot3	INT C#	INT D#	INT A#	INT B#

Video/ Graphics Cards

If available, this mainboard takes advantage of the CPU's integrate graphics processor, but discrete video cards can be installed by way of the mainboard's expansion slots. Adding on one or more discrete video cards will significantly boost the system's graphics performance. For best compatibility, MSI graphics cards are recommended.

Single Video Card Installation

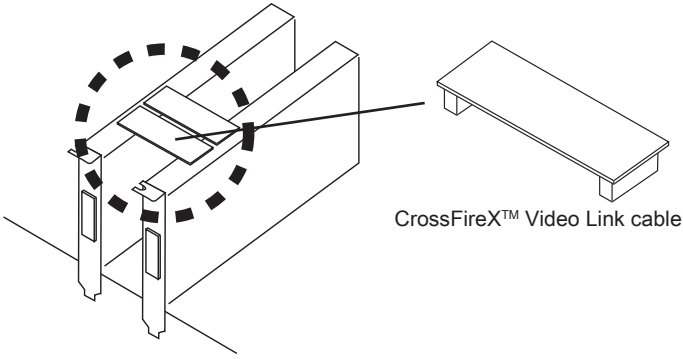
1. Determine what type of expansion slot(s) the video card will use. Locate the expansion slot(s) on the mainboard. Remove any protective expansion slot covers from the computer case.
2. Line up the video card on top of the expansion slot(s) with the display ports facing out of the computer case. For a single video card installation, using the PCI_E2 slot is recommended.
3. Push the video card into its expansion slot(s). Depending on the expansion slot(s) used, there should be clip(s) on the expansion slot(s) that will lock in place.
4. If needed, screw the edge of the graphics card to the computer case. Some video cards might require a power cable directly from the power supply.
5. Please consult your video card's manual for further instructions regarding driver installation or other special settings.



AMD CrossFireX™ (Multi-GPU) Technology

AMD CrossFireX™ is a multi-GPU performance gaming platform. By linking together two or more discrete GPUs, CrossFireX™ can significant improve system graphics performance. It allows the ability to scale a system's graphics power as needed, making it the most scalable gaming platform. This mainboard will automatically detect CrossFireX™ technology and make changes in the BIOS as needed. Follow the instructions below to ensure a successful two-way CrossFireX™ installation.

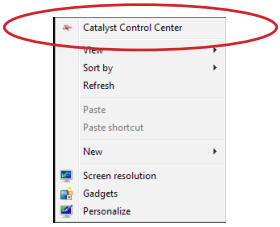
1. Install two AMD Radeon™ HD graphics cards into the PCIe x16 expansion slots.
2. With the two cards installed, two CrossFireX™ Video Link cable are required to connect the graphics cards. Attach one side of the cable on each of the cards by way of the metal contacts (please refer to the picture below). Please note that although two graphics cards have been installed, only the display ports on the graphics card installed in the first PCIe x16 slot will work. All displays should be connected to this graphics card.



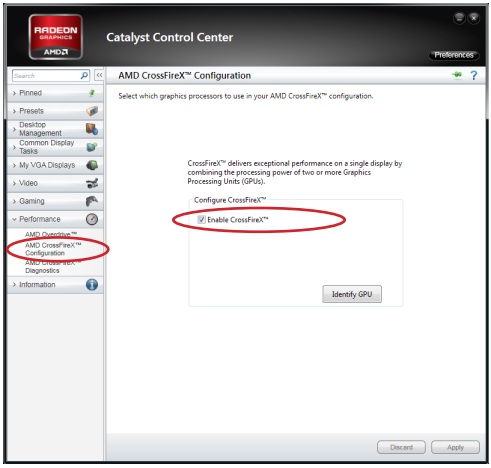
Important

- *Please ensure that all graphics cards used in CrossFireX™ mode are of the same brand and specifications. For best compatibility with the mainboard, MSI graphics cards are recommended.*
- *Make sure to connect an adequate power supply to the power connectors on the graphics cards to ensure stable operation.*
- *Only Windows® XP with Service Pack 2 (SP2), Windows™ XP Professional x64 Edition, Windows™ Vista, & Windows™ 7 will support CrossFireX™ mode.*

3. Boot up the computer and install the drivers and software included in your video card package. For more information, please refer to the manual that came with your video card.
4. After all of the hardware and software has been properly installed, reboot the system. After entering the operating system (OS), right click on the desktop and choose the “Catalyst Control Center”.



5. The CrossFireX™ setting must be enabled to allow CrossFireX™ mode to operate. The follow screen appears in the Catalyst Control Center. Depending on your operating system, the screen may look different.



Important

A CrossFireX™ system has four possible display modes:

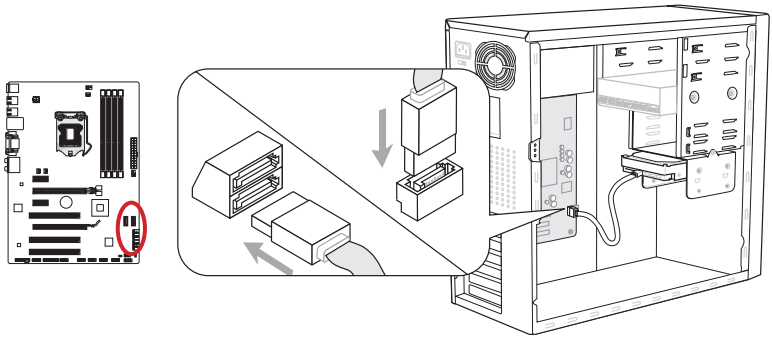
- *SuperTiling*
- *Scissor Mode*
- *Alternate Frame Rendering*
- *Super Anti-aliasing.*

For more details, please consult the graphics card manual.

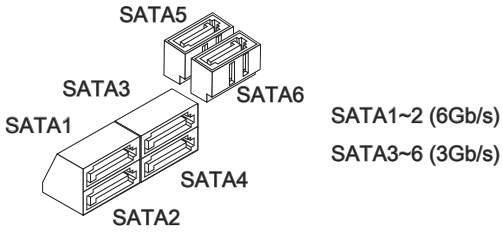
Internal Connectors

Serial ATA Connector: SATA1~6

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device. Serial ATA devices include disk drives (HDD), solid state drives (SSD), and optical drives (CD/ DVD/ Blu-Ray).



* The MB layout in this figure is for reference only.

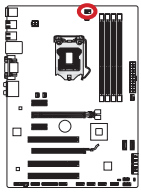


Important

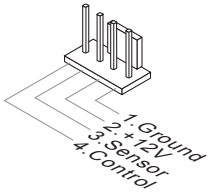
- *Many Serial ATA devices also need a power cable from the power supply. Such devices include disk drives (HDD), solid state drives (SSD), and optical drives (CD / DVD / Blu-Ray). Please refer to the device's manual for further information.*
- *Many computer cases also require that large Serial ATA devices, such as HDDs, SSDs, and optical drives, be screwed down into the case. Refer to the manual that came with your computer case or your Serial ATA device for further installation instructions.*
- *Please do not fold the Serial ATA cable at a 90-degree angle. Data loss may result during transmission otherwise.*
- *SATA cables have identical plugs on either sides of the cable. However, it is recommended that the flat connector be connected to the mainboard for space saving purposes.*

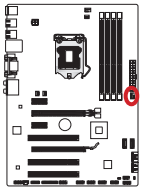
Fan Power Connectors: CPUFAN1,SYSFAN1~4

The fan power connectors support system cooling fans with +12V. If the mainboard has a System Hardware Monitor chipset on-board, you must use a specially designed fan with a speed sensor to take advantage of the CPU fan control. Remember to connect all system fans. Some system fans may not connect to the mainboard and will instead connect to the power supply directly. A system fan can be plugged into any available system fan connector.

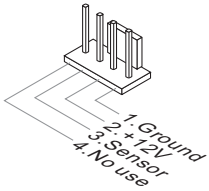


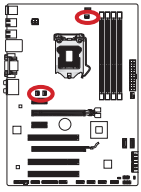
CPUFAN1



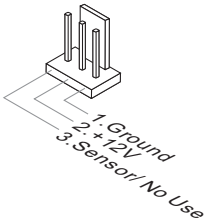


SYSFAN1





SYSFAN2~4

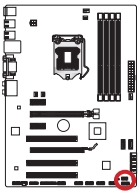


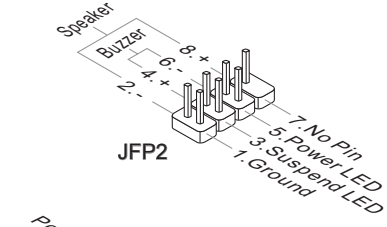
Important

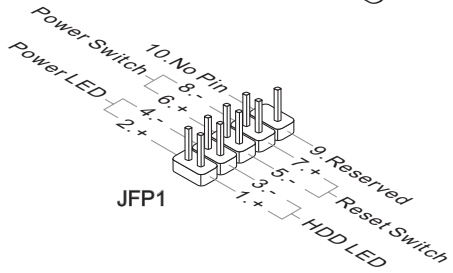
- *Please refer to your processor's official website or consult your vendor to find recommended CPU cooling fans.*
- *The CPUFAN1 connector supports Smart fan control. The Control Center utility can be installed to automatically control the fan speed according to the CPU's temperature.*
- *If there are not enough ports on the mainboard to connect all system fans, adapters are available to connect a fan directly to a power supply.*
- *Before first boot up, ensure that there are no cables impeding any fan blades.*

Front Panel Connectors: JFP1, JFP2

These connectors connect to the front panel switches and LEDs. The JFP1 connector is compliant with the Intel® Front Panel I/O Connectivity Design Guide. When installing the front panel connectors, please use the enclosed mConnectors to simplify installation. Plug all the wires from the computer case into the mConnectors and then plug the mConnectors into the mainboard.





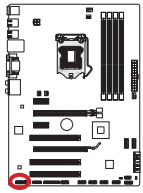


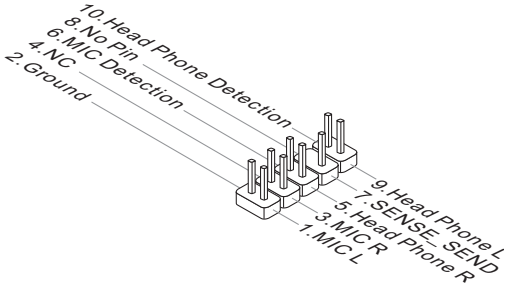
Important

- *On the connectors coming from the case, pins marked by small triangles are positive wires. Please use the diagrams above and the writing on the mConnectors to determine correct connector orientation and placement.*
- *The majority of the computer case's front panel connectors will primarily be plugged into JFP1.*

Front Panel Audio Connector: JAUD1

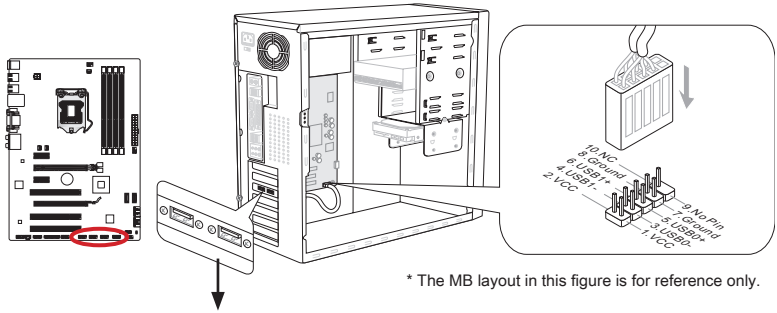
This connector allows you to connect the front audio panel located on your computer case. This connector is compliant with the Intel® Front Panel I/O Connectivity Design Guide.





USB 2.0 Expansion Connectors: JUSB1~4

This connector is designed for connecting high-speed USB peripherals such as USB HDDs, digital cameras, MP3 players, printers, modems, and many others.



* The MB layout in this figure is for reference only.

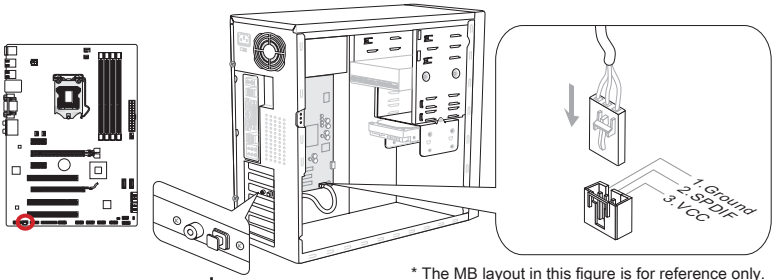
USB Bracket (optional)

Important

Note that the VCC and GND pins must be connected correctly to avoid possible damage.

S/PDIF-Out Expansion Connector: JSP1

This connector uses the S/PDIF (Sony & Phillips Digital Interconnect Format) interface for digital audio transmission.

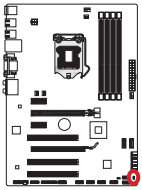


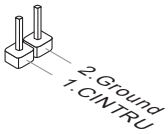
* The MB layout in this figure is for reference only.

S/PDIF-Out Bracket (optional)

Chassis Intrusion Connector: JCI1

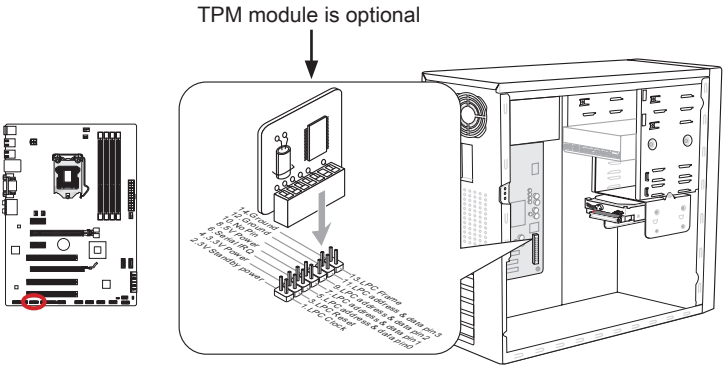
This connector connects to the chassis intrusion switch cable. If the computer case is opened, the chassis intrusion mechanism will be activated. The system will record this intrusion and a warning message will flash on screen. To clear the warning, you must enter the BIOS utility and clear the record.





TPM Module connector: JTPM1 (optional)

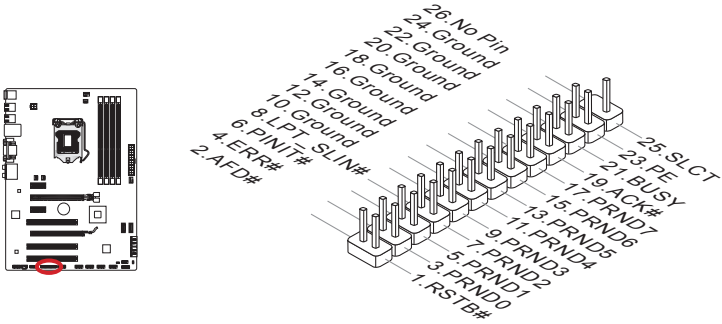
This connector connects to a TPM (Trusted Platform Module). Please refer to the TPM security platform manual for more details and usages.



* The MB layout in this figure is for reference only.

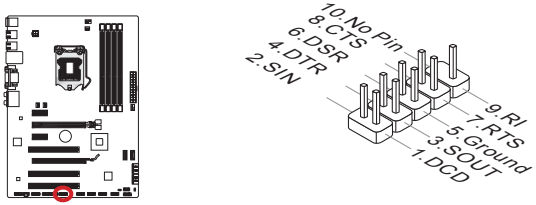
Parallel Port Header: JLPT1

This connector is used to connect an optional parallel port bracket. The parallel port is a standard printer port that supports Enhanced Parallel Port (EPP) and Extended Capabilities Parallel Port (ECP) mode.



Serial Port Connector: JCOM1

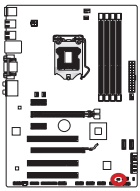
This connector is a 16550A high speed communication port that sends/receives 16 bytes FIFOs. You can attach a serial device.



Jumper

Clear CMOS Jumper: JBAT1

There is CMOS RAM onboard that is external powered from a battery located on the mainboard to save system configuration data. With the CMOS RAM, the system can automatically boot into the operating system (OS) every time it is turned on. If you want to clear the system configuration, set the jumpers to clear the CMOS RAM.

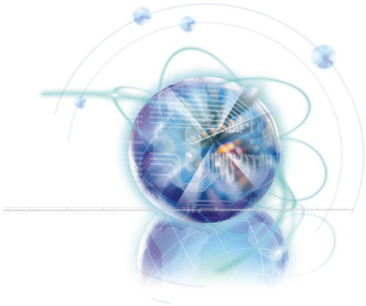


Keep Data

Clear Data

Important

You can clear the CMOS RAM by shorting this jumper while the system is off. Afterwards, open the jumper . Do not clear the CMOS RAM while the system is on because it will damage the mainboard.



Chapter 2

BIOS Setup

CLICK BIOS II is a revolutionary UEFI interface that allows you to setup and configure your system for optimum use. Using your mouse and keyboard, users can change BIOS settings, monitor CPU temperature, select the boot device priority and view system information such as the CPU name, DRAM capacity, the OS version and the BIOS version. Users can import and export parameter data for backup or for sharing with friends. By connecting to the Internet within CLICK BIOS II, users can browse webpages, check mail and use Live Update in your system.

Entering

Power on the computer and the system will start the Power On Self Test (POST) process. When the message below appears on the screen, please <DEL> key to enter CLICK BIOS II:

Press DEL key to enter Setup Menu, F11 to enter Boot Menu

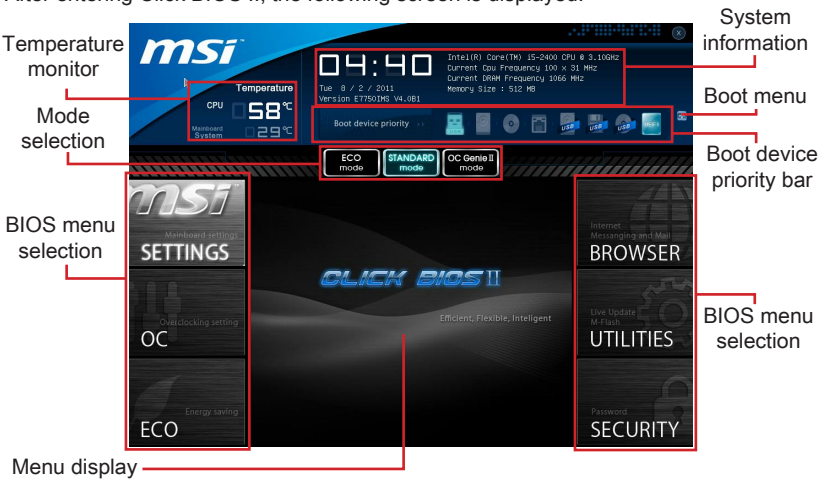
If the message disappears before you respond and you still need to enter CLICK BIOS II, restart the system by turning the computer OFF then back ON or pressing the RESET button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Important

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

Overview

After entering Click BIOS II, the following screen is displayed.



Important

The pictures in this guide are for reference only and may vary from the product you purchased. Please refer to the actual screens of your system for detailed information.

▸**Temperature monitor**

This block shows the temperature of the processor and the mainboard.

▸ **System information**

This block shows the time, date, CPU name, CPU frequency, DRAM frequency, DRAM capacity and the BIOS version.

▸ **BIOS menu selection**

The following options are available:

- **SETTINGS** - Use this menu to specify your settings for chipset features and boot devices.
- **OC** - This menu contains items of the frequency and voltage adjustments. Increasing the frequency can get better performance, however high frequency and heat can cause instability, we do not recommend general users to overclock.
- **ECO** - This menu is related to energy-saving settings.
- **BROWSER** - This feature is used to enter the MSI Winki web browser.
- **UTILITIES** - This menu contains utilities for backup and update.
- **SECURITY** - The security menu is used to keep unauthorized people from making any changes to the settings. You can use these security features to protect your system.

▸ **Boot device priority bar**

You can move the device icons to change the boot priority.

▸ **Boot menu**

This button is used to open a boot menu. Click the item to boot the system from the device instantly.

▸ **Mode selection**

This feature allows you to load presets of energy saving or overclocking.

▸ **Menu display**

This area provides BIOS settings and information to be configured.

Boot device priority bar

This bar shows the priority of the boot devices. The lighted icons indicate that the devices are available.

High priority ⟶ Low priority

Click and draw the icon to left or right to specify the boot priority.

- **Boot device icon list**

USB Drive

Hard disk drive

Optical disk

LAN

USB hard disk drive

USB floppy

USB optical drive

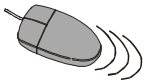
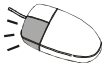
UEFI

BEV

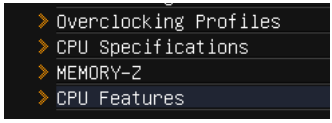
Disable

Operation

CLICK BIOS II allows you to control BIOS settings with the mouse and the keyboard. The following table lists and describes the hot keys and the mouse operations.

Hot key	Mouse	Description
<↑ ↓ →← >	 Move the cursor	Select Item
<Enter>	 Click/ Double-click the left button	Select Icon/ Field
<Esc>	Click the right button	Jump to the Exit menu or return to the previous from a submenu
<+>		Increase the numeric value or make changes
<->		Decrease the numeric value or make changes
<F1>		General Help
<F4>		CPU Specifications
<F5>		Enter Memory-Z
<F6>		Load optimized defaults
<F10>		Save Change and Reset
<F12>		Save a screenshot to a FAT/FAT32 USB drive

Sub-Menu

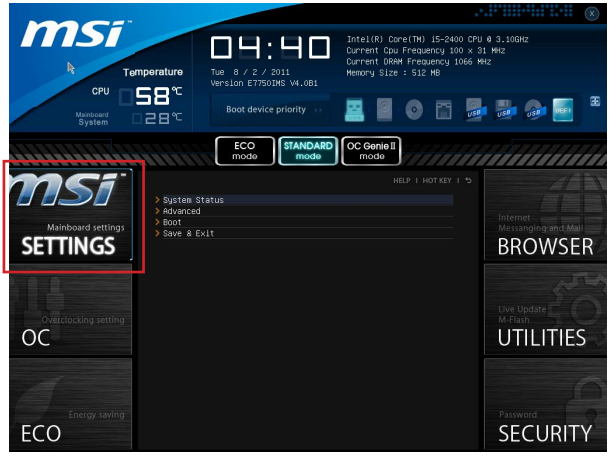


If you find a point symbol to the left of certain fields, that means a sub-menu can be launched for additional options. You can use the arrow keys or mouse to highlight the field and press <Enter> or double-click the left mouse button to enter the sub-menu. If you want to return to the previous menu, just press <Esc> or click the right mouse button.

General Help

The General Help screen lists the appropriate keys to use for navigation. You can call up this screen from any menu by simply pressing <F1>. Press <Esc> to exit the Help screen.

SETTINGS



System Status

▸**System Date**

This allows you to set the system date that you want (usually the current date).

The format is <day> <month> <date> <year>.

day	Day of the week, from Sun to Sat, determined by BIOS. Read-only.
month	The month from Jan. through Dec.
date	The date from 1 to 31 can be keyed by numeric function keys.
year	The year can be adjusted by users.

▸**System Time**

This allows you to set the system time that you want (usually the current time). The time format is <hour> <minute> <second>.

▸**SATA Port1~6**

Shows devices connected to specific SATA ports.

Important

If your device is not displayed, turn off computer and re-check SATA cable and power cable connections to the device.

▸**System Information**

Shows detailed system information, including CPU type, BIOS version, and Memory (read only).

Advanced

▸PCI Subsystem Settings

Press <Enter> to enter the sub-menu.

▸PCI Latency Timer

Controls how long each PCI device can hold the bus before another takes over.

When set to higher values, every PCI device can conduct transactions for a longer time and thus improve the effective PCI bandwidth.

▸ACPI Settings

Press <Enter> to enter the sub-menu.

▸ACPI Standby State

Specifies the power saving mode for ACPI function

[S1] Sleep Mode. Hardware remains on.

[S3] Suspend to RAM. Turns off hardware. (Recommended)

▸Power LED

Configures how the system uses power LEDs on the case to indicate sleep/ suspend state.

[Dual] The power LED changes its color to indicate the sleep/suspend state.

[Blinking] The power LED blinks to indicate the sleep/suspend state.

▸Integrated Peripherals

Press <Enter> to enter the sub-menu.

▸Onboard Lan Controller

This item allows you to enable/ disable the onboard LAN controller.

▸Lan Option ROM

This item is used to decide whether to invoke the Boot ROM of the onboard LAN.

▸SATA Mode

This item is used to specify RAID/ IDE/ AHCI mode for SATA port.

Important

You cannot switch between AHCI and IDE if you already have your operating system installed. If you have installed your OS using AHCI and you clear your BIOS/reset to default settings, you will need to change this function back to AHCI to ensure proper functionality.

▸HD Audio Controller

This item allows you to enable/ disable the HD audio controller.

▸HPET

The HPET (High Precision Event Timers) is a component that is part of the chipset.

You can enable it, and will provide you with the means to get to it via the various ACPI methods.

▸ Integrated Graphics Configuration

Press <Enter> to enter the sub-menu.

▸ Virtu Technology

Enable or Disable Virtu GPU Switching Technology (if supported).

[i-Mode] Provides power saving features and special processor functionality

[d-Mode] Uncompromised 3D performance from the discrete GPU

▸ Initiate Graphic Adapter

Choose which adapter you wish to make the primary option

[IGD] Integrated Graphics Display

[PEG] PCI-Express Graphics Device

▸ Integrated Graphics Share Memory

The system shares memory to the onboard graphics. This setting controls the exact memory size shared to theonboard graphics.

▸ DVMT Memory

Specify the memory size of DVMT memory to allocate for video memory.

▸ IGD Multi-Monitor

Enables both integrated and discrete graphics at the same time. When disabled, it will default to Initiated Graphics Adapter selection.

▸ USB Configuration

Press <Enter> to enter the sub-menu.

▸ USB Controller

This item allows you to enable/ disable the integrated USB 2.0 controller.

▸ Legacy USB Support

Enable or disable support for USB keyboards, mice and floppy drives. You will be able to use these devices with operating systems that do not support USB.

▸ Onboard USB 3.0 Controller (optional)

This item allows you to enable/ disable the USB 3.0 controller.

▸ Super IO Configuration

Press <Enter> to enter the sub-menu.

▸ Serial(COM) Port 0 Configuration

Press <Enter> to enter the sub-menu.

▸ Serial (COM) Port0

This item allows you to enable/ disable the serial port.

▸ Serial (COM) Port0 Settings

Select an address and corresponding interrupt for the serial port.

▸ Parallel(LPT) Port Configuration

Press <Enter> to enter the sub-menu.

▸ Parallel (LPT) Port

This item allows you to enable/ disable the parallel port.

▸ Parallel (LPT) Port Settings

Select an address and corresponding interrupt for the parallel port.

▸ Device Mode

Select a device mode for parallel port.

▸ Hardware Monitor

Press <Enter> to enter the sub-menu.

▸ CPU Smart Fan Target

Controls CPU fan speed automatically depending on the current temperature and to keep it with a specific range. If the current CPU temperature reaches the target value, the smart fan function will be activated.

▸ CPU/ System Temperature, CPU FAN/ SYS FAN 1/ 2 Speed

These items show the current status of all of the monitored hardware devices/ components such as CPU temperature/ system temperature and all fans' speeds.

▸ Power Management Setup

Press <Enter> to enter the sub-menu.

▸ EuP 2013

Energy Using Products Lot 6 2013 (EUP) reduces power consumption when system is off or in standby mode.

Note: When enabled, the system will not support RTC wake up event functions.

▸ Restore after AC Power Loss

This item specifies whether your system will reboot after a power failure or interrupt occurs. Settings are:

[Power Off]	Always leaves the computer in the power off state.
[Power On]	Always leaves the computer in the power on state.
[Last State]	Restore the system to the status before power failure or interrupt occurred.

▸ Wake Up Event Setup

Press <Enter> to enter the sub-menu.

▸ Wake Up Event By

Setting to [BIOS] activates the following fields, and use the following fields to set the wake up events. Setting to [OS], the wake up events will be defined by OS.

▸ Resume By RTC Alarm

The field is used to enable or disable the feature of booting up the system on a scheduled time/date.

▸ Date/ HH:MM:SS

If Resume By RTC Alarm is set to [Enabled], the system will automatically resume (boot up) on a specific date/hour/minute/second specified in these fields (using the <+> and <-> to select the date & time settings).

▸ Resume By PCI or PCI-E Device

When set to [Enabled], the feature allows your system to be awakened from the power saving modes through any event on PCI or PCIe device.

▸ Resume From S3 by USB Device

The item allows the activity of the USB device to wake up the system from S3 (Suspend to RAM) sleep state.

▸ Resume From S3/S4/S5 by PS/2 Mouse/ Keyboard

These items determine whether the system will be awakened from what power saving modes when input signal of the PS/2 mouse/ keyboard is detected.

Boot

▸Full Screen Logo Display

This item enables this system to show the company logo on the boot-up screen. [Enabled] Shows a still image (logo) on the full screen at boot.

[Disabled] Shows the POST messages at boot.

== Boot Option Priorities==

▸1st~8th Boot

These items are used to prioritize the installed boot devices.

▸USB KEY Drive BBS Priorities/ UEFI Boot Drive BBS Priorities

▸1st~8th Boot

These items are used to prioritize the installed USB key drives/ UEFI boot drives.

Save & Exit

▸Discard Changes and Exit

Use this item to abandon all changes and exit setup.

▸Save Changes and Reboot

Use this item to save changes and reset the system.

▸Save Changes

Use this item to save changes.

▸Discard Changes

Use this item to abandon all changes.

▸Restore Defaults

Use this item to load the optimized default values set by the BIOS vendor.

== Boot Override ==

The installed storage devices will appear on this menu, you can select one of them be a boot device.

▸Built-in EFI Shell

Use this item to enter the EFI Shell.

OC

Important

- *Overclocking your PC manually is only recommended for advanced users.*
- *Overclocking is not guaranteed, and if done improperly, can void your warranty or severely damage your hardware.*
- *If you are unfamiliar with overclocking, we advise you to use OC Genie for easy overclocking.*

▸Current CPU / DRAM Frequency

These items show the current clocks of CPU and Memory speed. Read-only.

▸CPU Base Frequency [10KHz]

Allows you to set the CPU Base clock (in 10KHz increments). You may overclock the CPU by adjusting this value. Please note that overclocking behavior and stability is not guaranteed.

▸Adjust CPU Ratio

Controls the multiplier that is used to determine internal clock speed of the processor. This feature can only be changed if the processor supports this function.

▸Adjusted CPU Frequency

It shows the adjusted CPU frequency. Read-only.

▸Adjust CPU Ratio in OS

Enable this item to allow CPU ratio changes in the OS by using MSI Control Center.

▸Internal PLL Overvoltage

This item is used to adjust the PLL voltage.

▸EIST

Enhanced Intel SpeedStep technology allows you to set the performance level of the microprocessor whether the computer is running on battery or AC power. This field only appears with installed CPUs that support this technology.

▸Intel Turbo Boost

Enables or disables Intel Turbo Boost which automatically boosts CPU performance above rated specifications (when applications requests the highest performance state of the processor).

▸OC Genie Button Operation

This field is used to enable/ disable OC Genie function.

▸DRAM Frequency

This item allows you to adjust the DRAM frequency. Please note the overclocking behavior is not guaranteed.

▸Adjusted DRAM Frequency

It shows the adjusted DRAM frequency. Read-only.

▸DRAM Timing Mode

Select whether DRAM timing is controlled by the SPD (Serial Presence Detect) EEPROM on the DRAM module. Setting to [Auto] enables DRAM timings and the following "Advanced DRAM Configuration" sub-menu to be determined by BIOS based on the configurations on the SPD. Selecting [Link] or [Unlink] allows users to configure the DRAM timings for each channel and the following related "Advanced DRAM Configuration" sub-menu manually.

▸Advanced DRAM Configuration

Press <Enter> to enter the sub-menu.

▸Command Rate

This setting controls the DRAM command rate.

▸tCL

Controls CAS latency which determines the timing delay (in clock cycles) of starting a read command after receiving data.

▸tRCD

Determines the timing of the transition from RAS (row address strobe) to CAS (column address strobe). The less clock cycles, the faster the DRAM performance.

▸tRP

Controls number of cycles for RAS (row address strobe) to be allowed to pre-charge. If insufficient time is allowed for RAS to accumulate before DRAM refresh, the DRAM may fail to retain data. This item applies only when synchronous DRAM is installed in the system.

▸tRAS

Determines the time RAS (row address strobe) takes to read from and write to memory cell.

▸ tRFC

This setting determines the time RFC takes to read from and write to a memory cell.

▸ tWR

Determines minimum time interval between end of write data burst and the start of a pre-charge command. Allows sense amplifiers to restore data to cell.

▸ tWTR

Determines minimum time interval between the end of write data burst and the start of a column-read command; allows I/O gating to overdrive sense amplifiers before read command starts.

▸ tRRD

Specifies the active-to-active delay of different banks.

▸ tRTP

Time interval between a read and a precharge command.

▸ tFAW

This item is used to set the tFAW (four activate window delay) timing.

▸ tWCL

This item is used to set the tWCL (Write CAS Latency) timing.

▸ tCKE

This item is used to set the Pulse Width for DRAM module.

▸ tRTL

This item is used to set Round Trip Latency settings.

▸ Advanced Channel 1/ 2 Timing Configuration

Press <Enter> to enter the sub-menu. And you can set the advanced memory timing for each channel.

▸ GT OverClocking

This item allows you to enable/ disable the overclocking of integrated graphics.

▸ GT Ratio

This setting controls the ratio of integrated graphics frequency to enable the integrated graphics to run at different frequency combinations.

▸ Adjusted GT Frequency

It shows the adjusted integrated graphics frequency. Read-only.

▸ Spread Spectrum

This function reduces the EMI (Electromagnetic Interference) generated by modulating clock generator pulses.

Important

- *If you do not have any EMI problem, leave the setting at [Disabled] for optimal system stability and performance. But if you are plagued by EMI, select the value of Spread Spectrum for EMI reduction.*

- *The greater the Spread Spectrum value is, the greater the EMI is reduced, and the system will become less stable. For the most suitable Spread Spectrum value, please consult your local EMI regulation.*
- *Remember to disable Spread Spectrum if you are overclocking because even a slight jitter can introduce a temporary boost in clock speed which may just cause your overclocked processor to lock up.*

▸DRAM Voltage

This item is used to adjust the memory voltage.

▸Overclocking Profiles

Press <Enter> to enter the sub-menu.

▸Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Press <Enter> to enter the sub-menu.

▸Set Name for Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Give a name by typing in this item.

▸Save Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Save the current overclocking settings to ROM for selected profile.

▸Load/ Clear Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Load/ Clear the stored profile settings from ROM.

▸Overclocking Profile Save

Save the current overclocking settings to USB drive.

▸Overclocking Profile Load

Load the stored settings from USB drive.

▸CPU Specifications

Press <Enter> to enter the sub-menu. This sub-menu highlights all the key features of your CPU. The information will vary by model and is read-only. You can also access this information at any time by pressing [F4].

▸CPU Technology Support

Press <Enter> to enter the sub-menu. The sub-menu shows the installed CPU technologies. Read only.

▸MEMORY-Z

Press <Enter> to enter the sub-menu. This sub-menu highlights all the settings and timings of your DIMMs. This information will vary by model and is read-only. You can also access this information at any time by pressing [F5].

▸DIMM1~4 Memory SPD

Press <Enter> to enter the sub-menu. The sub-menu displays the informations of installed memory.

▸CPU Features

Press <Enter> to enter the sub-menu.

▸Active Processor Cores

This item allows you to select the number of active processor cores.

▸ Limit CPUID Maximum

It is designed to limit the listed speed of the processor to older operating systems.

▸ Execute Disable Bit

Can prevent certain classes of malicious “buffer overflow” attacks where worms can try to execute code to damage your system. It is recommended you keep this enabled always.

▸ Intel Virtualization Tech

Enhances virtualization and allows the system to act as multiple virtual systems. See Intel’s official website for more information.

▸ Intel VT-D Tech

This item is used to enable/disable the Intel VT-D technology. For further information please refer to Intel’s official website.

▸ Power Technology

This item allows you to select the Intel Dynamic Power technology mode.

▸ C1E Support

Enable system to reduce CPU power consumption while idle. Not all processors support Enhanced Halt state (C1E).

▸ OverSpeed Protection

Monitors current CPU draw as well as power consumption; if it exceeds a certain level, the processor automatically reduces its clock speed. For overclocking, it is recommended this feature is disabled.

▸ Intel C-State

C-state is a power management state that detects when the system is idle and lowers power consumption accordingly.

▸ Package C State limit

This field allows you to select a C-state mode.

▸ Long duration power limit (W)

This field allows you to adjust the TDP power limit for the long duration.

▸ Long duration maintained (ms)

This field allows you to adjust the maintaining time for long duration power limit.

▸ Short duration power limit (W)

This field allows you to adjust the TDP power limit for the short duration.

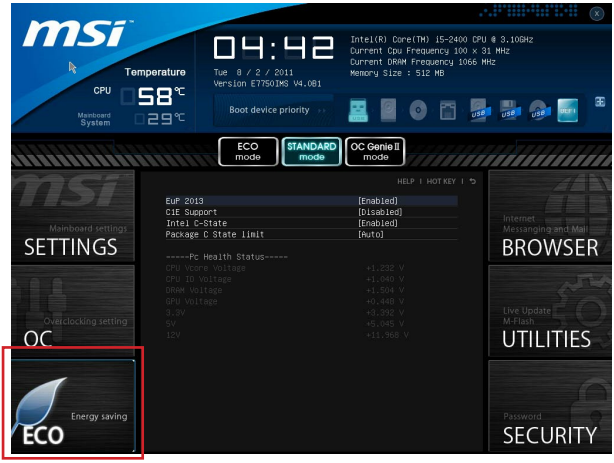
▸ Primary/ Secondary plane turbo power limit (W)

These fields allow you to adjust the TDP limit for the primary/ secondary plane turbo.

▸ 1/2/3/4-Core Ratio Limit

These fields show the 1/2/3/4 core ratio limit of CPU.

ECO



Important

Once you click the "ECO" button in the pre-set area, some items in ECO menu will be fixed and un-adjustable.

▸**EuP 2013**

Energy Using Products Lot 6 2013 (EUP) reduces power consumption when system is off or in standby mode.

Note: When enabled, the system will not support RTC wake up event functions.

▸**C1E Support**

To enable this item to reduce the CPU power consumption while idle. Not all processors support Enhanced Halt state (C1E).

▸**Intel C-State**

C-state is a power management state that detects when the system is idle and lowers power consumption accordingly.

▸**Package C State limit**

This field allows you to select a C-state mode.

▸**CPU Core Voltage/ CPU I/O Voltage/ GPU Voltage/ DRAM Voltage/ 3.3V/ 5V/ 12V**

These items show the amperages. Read only.

BROWSER

Please install the MSI "Winki" application first in the Windows operating system with the MSI Driver Disc before using the browser. Then you can click the BROWSER to access the Internet, e-mail and instant messaging.

Installing Winki

To install Winki, follow the steps below:

1. Power on your computer and enter Windows operating system.
2. Insert MSI Driver Disc into the optical drive. The setup screen will automatically appear.
3. Click Driver tab.
4. Click OTHERS button.
5. Select Winki to start installing.
6. When finished, restart your computer.

UTILITIES

▸HDD Backup

Hard disk storage backups and restoring is one of the most common and important tasks. Use this utility to create an image of your HDD partitions and re-load them when necessary.

▸Live Update

This tool can detect and update your BIOS online so that you won't need to spend time searching manually.

Important

HDD Backup and Live Update request Winki, please install the "Winki" software application from MSI Driver Disc in Windows first. And then you can access these two utilities by clicking their respective buttons.

▸M-Flash

▸BIOS Boot Function

This allows you to enable/ disable the system to boot from the BIOS file inside USB drive (FAT/ 32 format only).

▸Select one file to boot

When the BIOS Boot function as sets to [Enabled], this item is selectable. This item allows to select particular BIOS file from the USB/ Storage (FAT/ 32 format only) drive. And the system will boot from selected BIOS file.

▸Save BIOS to storage

Please setup a specific folder in specific USB/ Storage drive to save BIOS file from BIOS ROM chip data. Note: it only supports FAT/ 32 file system drive.

▸ **Select one file to update BIOS**

This item allows you to select a particular BIOS file from the USB/ Storage (FAT/ 32 format only) drive for updating BIOS.

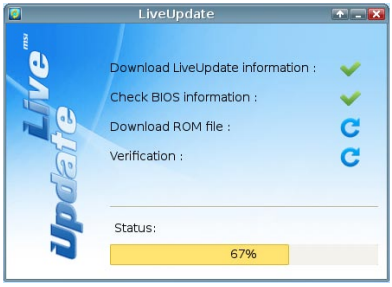
Updating the BIOS with Live Update

This section tells you how to update the BIOS by using the Live Update utility before entering Operating System. Live Update will update the BIOS automatically when connecting to the Internet. To update the BIOS with the Live Update utility:

1. Click Live Update button on the BIOS UTILITIES menu. (The Winki must be installed).

LiveUpdate
Edit connections
You can activate the connection by clicking this icon. Use connection editor to add new and to change settings if necessary.
Status:

2. Setup the connection by click the setting button if necessary.
3. Click the next button .
4. Live Update will automatically detect the version of BIOS and download the appropriate file.

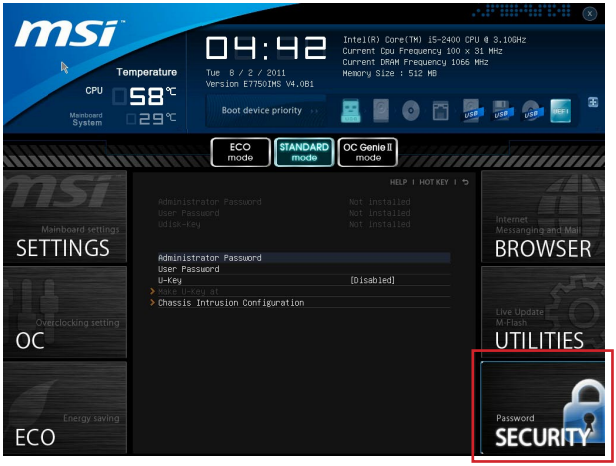


5. Click the confirm button to update the BIOS.

Important

Do not unplug or shut off your system during BIOS Flash. Incorrect BIOS flashing can cause the motherboard to not POST. Please ensure you have the correct version and model of your motherboard BIOS before updating.

SECURITY



▸**Administrator Password**

Set the administrative password that will be required to enter the BIOS.

▸**User Password**

Set the user password that will be required to enter the operating system.

Important

When selecting the Administrative / User Password items, a password box will appear on the screen. Type the password then press <Enter>. The password typed now will replace any previous set password from CMOS memory. You will be prompted to confirm the password. You may also press <Esc> to abort the selection.

To clear a set password, press <Enter> when you are prompted to enter a new password. A message will confirm the password is being disabled. Once the password is disabled, you can enter the setup and OS without authorization.

▸**U-Key**

Enable or disable USB driver device as key. This requires the USB device to be plugged in for access to the computer..

▸**Make U-Key at**

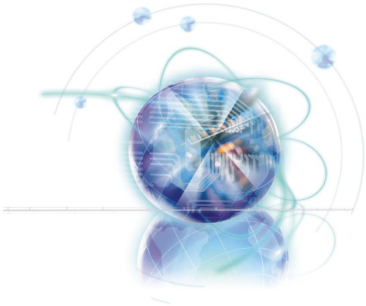
When the “U-Key” as sets to [Enabled], this item is selectable. This item allows you to specify the USB drive.

▸**Chassis Intrusion Configuration**

Press <Enter> to enter the sub-menu.

▸**Chassis Intrusion**

Enables or disables the feature of recording the chassis intrusion status and issuing a warning message if opened. To clear the warning logs, set the field to [Reset]. The setting of the field will return to [Enabled] later.



Appendix A

Realtek Audio

The Realtek audio provides 10-channel DAC that simultaneously supports 7.1 sound playback and 2 channels of independent stereo sound output (multiple streaming) through the Front-Out-Left and Front-Out-Right channels.

Installing the Realtek HD Audio Driver

You need to install the HD audio driver for Realtek audio codec to function properly before you can get access to 2-, 4-, 6-, 8- channel or 7.1+2 channel audio operations. Follow the procedures described below to install the drivers for different operating systems.

Installation for Windows®

For Windows® XP, you must install Windows® XP Service Pack3 or later before installing the driver.

The following illustrations are based on Windows® 7 environment and could look slightly different if you install the drivers in different operating systems.

1. Insert the application DVD into the DVD-ROM drive. The setup screen will automatically appear.
2. Click Driver tab.
3. Click AUDIO button.

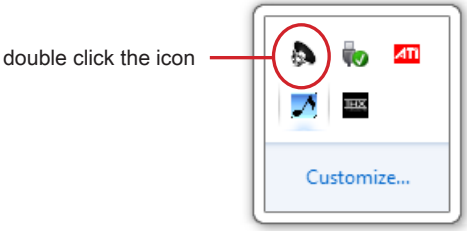
4. Select Realtek HD Audio Drivers to start installing the drivers.
5. Click Next to install the Realtek High Definition Audio Driver.
6. Follow the on-screen instructions to install drivers.
7. Click Finish to restart the system.

Important

The HD Audio Configuration software utility is under continuous update to enhance audio applications. Hence, the program screens shown here in this section may be slightly different from the latest software utility and shall be held for reference only.

Software Configuration

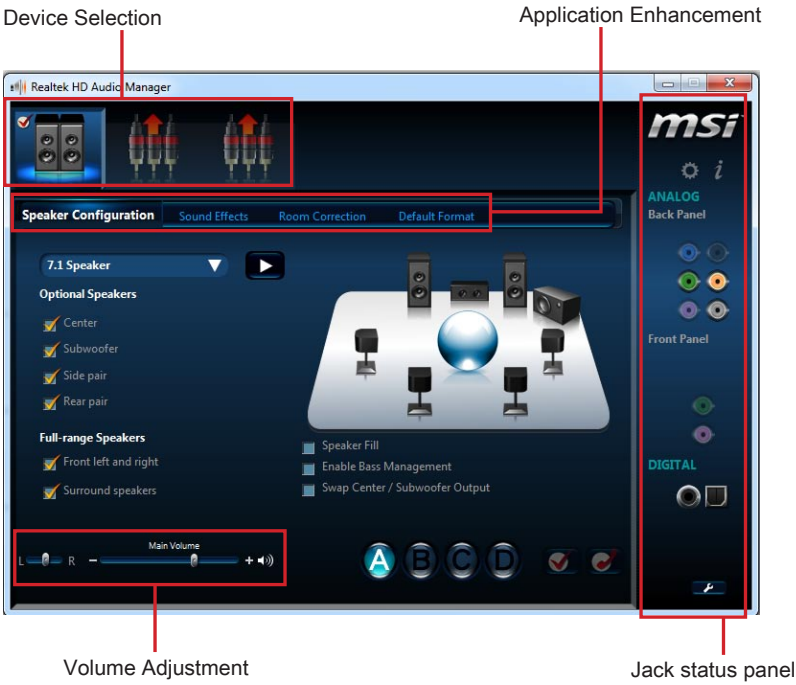
After installing the audio driver, the “Realtek HD Audio Manager” icon will appear at the notification area (lower right of the screen). You may double click the icon and the GUI will pop up accordingly.



It is also available to enable the audio driver by clicking the **Realtek HD Audio Manager** from the **Control Panel**.

Software panel overview

The following figure describes the function of the Realtek HD Audio Manager panel.



■ Device Selection

Here you can select a audio output source to change the related options. The “check” sign (in orange) indicates the devices as default.

■ Volume Adjustment

You can control the volume or balance the right/left side of the speakers that you plugged in front or rear panel by adjust the bar.

■ Application Enhancement

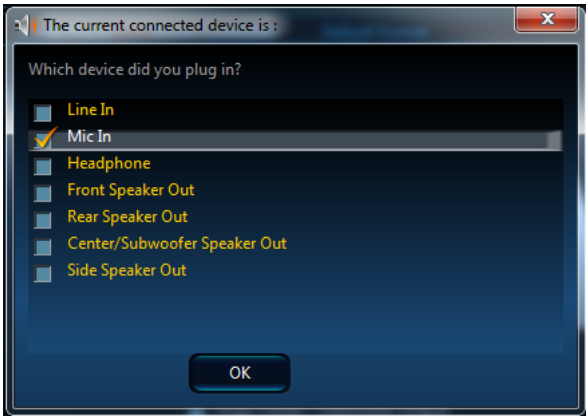
The array of options will provide you a complete guidance of anticipated sound effect for both output and input device.

■ Jack status panel

This panel depicts all render and capture devices currently connected with your computer.

Auto popup dialog

When you plug into the device at the jack, a dialogue window will pop up asking you which device is current connected.

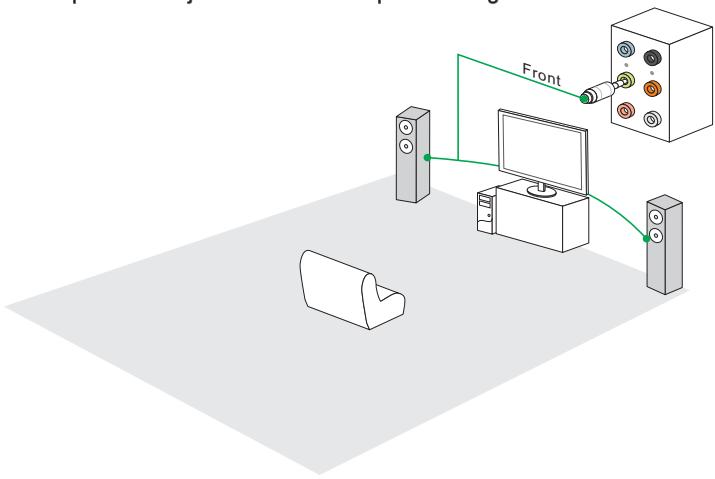


As you know, each jack corresponds to its default setting, you can refer to the next section “Hardware Default Setting”.

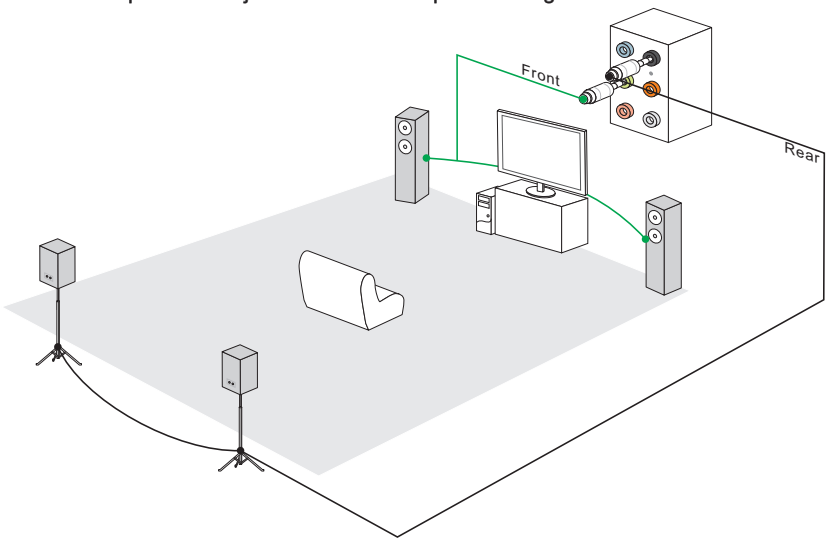
Hardware Default Setting

The following diagrams are audio back panel default setting.

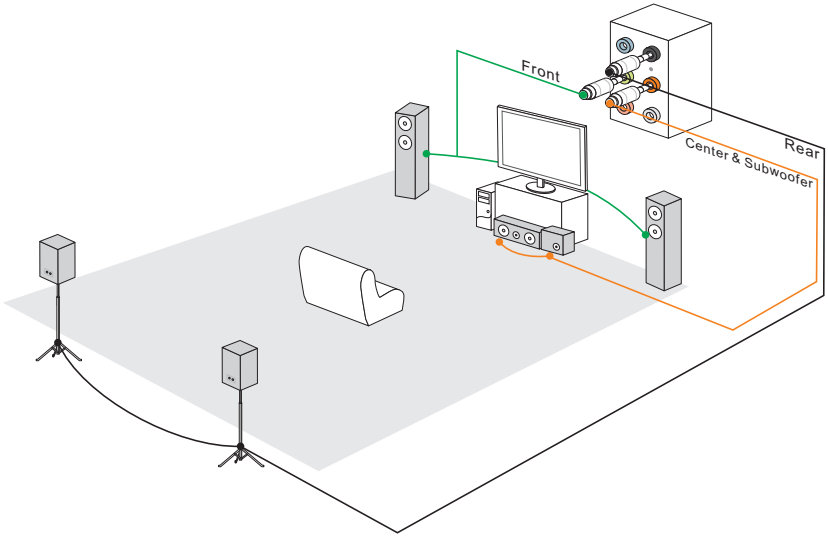
- **Backpanel audio jacks to 2-channel speakers diagram**



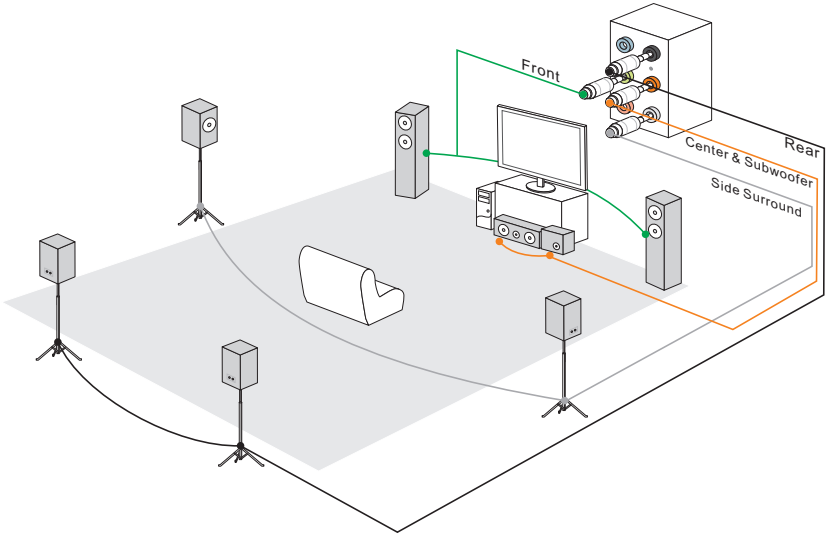
- **Backpanel audio jacks to 4-channel speakers diagram**

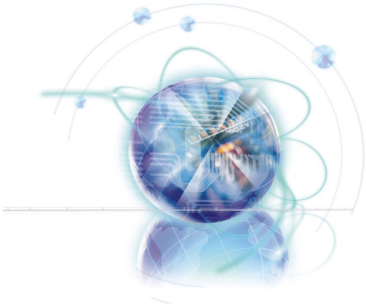


- Backpanel audio jacks to 6-channel speakers diagram



- Backpanel audio jacks to 8-channel speakers diagram





Appendix B

Intel RAID

This appendix will assist users in configuring and enabling RAID functionality and accelerating system on platforms

Introduction

The mainboard comes with the Intel RAID controller that allows you to configure SATA hard drives as RAID sets.

SATA hard drives deliver blistering transfer speeds up to 6 Gb/s. Serial ATA uses long, thin cables, making it easier to connect your drive and improving the airflow inside your PC. The most outstanding features are:

1. Supports 3 Gb/s or 6 Gb/s transfers with CRC error checking.
2. Supports Hot-plug-n-play feature.
3. Data handling optimizations including tagged command queuing, elevator seek and packet chain command.

Intel® RAID controller offers RAID level 0 (Striping), RAID level 1 (Mirroring and Duplexing), RAID level 5 (Block Interleaved Distributed Parity), RAID level 10 (A Stripe of Mirrors) , Intel® Rapid Storage Technology.

RAID 0 breaks the data into blocks which are written to separate hard drives. Spreading the hard drive I/O load across independent channels greatly improves I/O performance.

RAID 1 provides data redundancy by mirroring data between the hard drives and provides enhanced read performance.

RAID 5 Provides data striping at the byte level and also stripe error correction information. This results in excellent performance and good fault tolerance. Level 5 is one of the most popular implementations of RAID.

RAID 10 Not one of the original RAID levels, multiple RAID 1 mirrors are created, and a RAID 0 stripe is created over these.

Intel® Rapid Storage Technology is the advanced ability for two RAID volumes to share the combined space of two hard drives being used in unison.

Intel® Rapid Storage Technology utilizes RAID 1 functionality to copy data from a designated Master drive to a designated Recovery drive. The size of the Master drive must be less than or equal to the size of the Recovery drive. When a Recovery volume is created, complete capacity of the Master drive will be used as the Master volume. Only one Recovery Volume can exist on a system. There are 2 methods of updating the data on the Master to the Recovery drive. They are Continuous Update Policy and On Request Update Policy.

Important

The least number of hard drives for RAID 0, RAID 1, Recovery or Matrix mode is 2. The least number of hard drives for RAID 10 mode is 4. And the least number of hard drives for RAID 5 mode is 3.

All the information/ volumes/ pictures listed in your system might differ from the illustrations in this appendix.

BIOS Configuration

The Intel Rapid Storage Technology Option ROM should be integrated with the system BIOS on all mainboards with a supported Intel chipset. The Intel Rapid Storage Technology Option ROM is the Intel RAID implementation and provides BIOS and DOS disk services. Please use <Ctrl> + <I> keys to enter the "Intel® RAID for Serial ATA" status screen, which should appear early in system boot-up, during the POST (Power-On Self Test). Also, you need to enable the RAID function in BIOS to create, delete and reset RAID volumes.

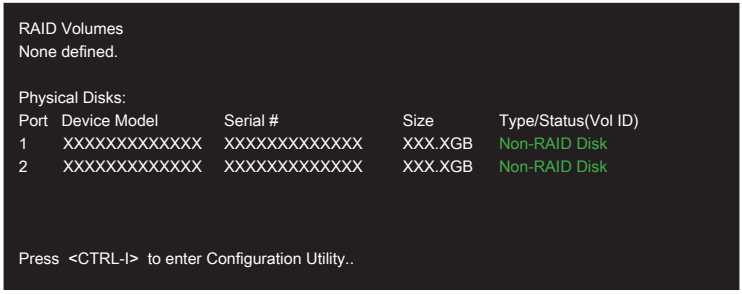
Using the Intel Rapid Storage Technology Option ROM

Creating, Deleting and Resetting RAID Volumes:

The Serial ATA RAID volume may be configured using the RAID Configuration utility stored within the Intel RAID Option ROM. During the Power-On Self Test (POST), the following message will appear for a few seconds.

Important

The "Device Model", "Serial #" and "Size" in the following example might be different from your system.

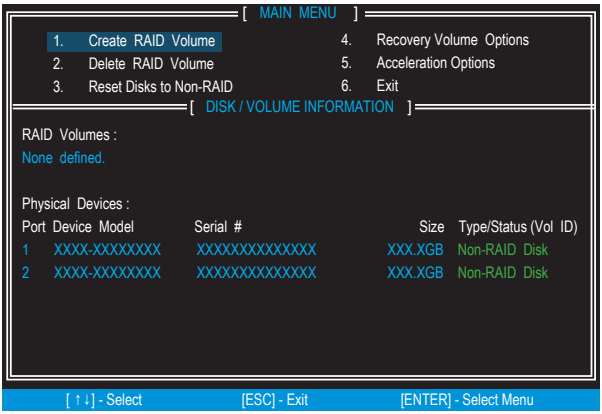

RAID Volumes
None defined.
Physical Disks:
Port Device Model Serial # Size Type/Status(Vol ID)
1 XXXXXXXXXXXX XXXXXXXXXXXX XXX.XGB Non-RAID Disk
2 XXXXXXXXXXXX XXXXXXXXXXXX XXX.XGB Non-RAID Disk
Press <CTRL-I> to enter Configuration Utility..

After the above message shows, press <Ctrl> and <I> keys simultaneously to enter the Intel Rapid Storage Technology Option ROM.

Important

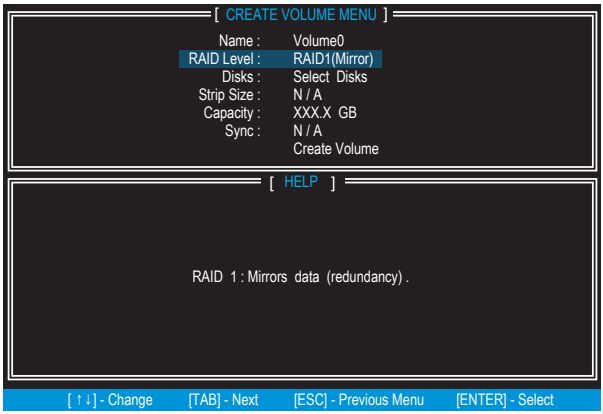
The following procedure is only available with a newly-built system or if you are reinstalling your OS. It should not be used to migrate an existing system to RAID.

After pressing the <Ctrl> and <I> keys simultaneously, the following window will appear:

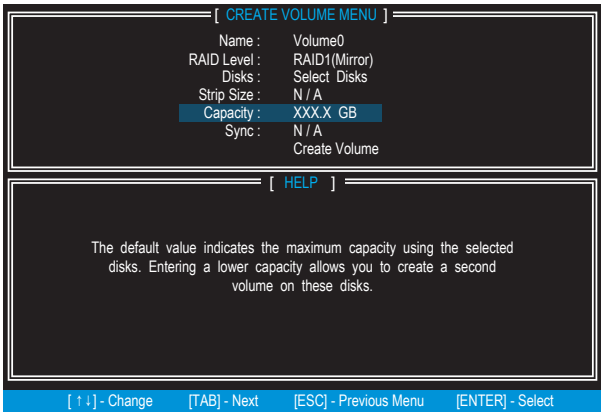

[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Recovery Volume Options
5. Acceleration Options
6. Exit
[DISK / VOLUME INFORMATION]
RAID Volumes :
None defined.
Physical Devices :
Port Device Model Serial # Size Type/Status (Vol ID)
1 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB Non-RAID Disk
2 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB Non-RAID Disk
[↑ ↓] - Select
[ESC] - Exit
[ENTER] - Select Menu

■ Create RAID Volume

1. Select option 1 “Create RAID Volume” and press <Enter> key. The following screen appears. Then in the Name field, specify a RAID Volume name and then press the <TAB> or <Enter> key to go to the next field.
2. Use the arrow keys to select the RAID level best suited to your usage model in RAID Level.


[CREATE VOLUME MENU]
Name : Volume0
RAID Level : RAID1(Mirror)
Disks : Select Disks
Strip Size : N / A
Capacity : XXX.X GB
Sync : N / A
Create Volume
[HELP]
RAID 1 : Mirrors data (redundancy) .
[↑ ↓] - Change
[TAB] - Next
[ESC] - Previous Menu
[ENTER] - Select

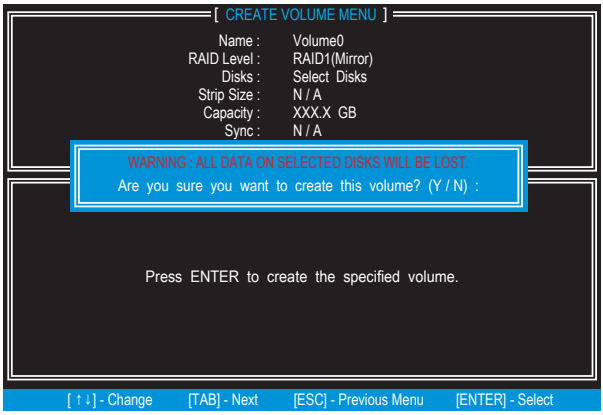
3. In the Disk field, press <Enter> key and use <Space> key to select the disks you want to create for the RAID volume, then click <Enter> key to finish selection. This field will become available according to the selected RAID level.
4. Then select the strip size for the RAID array by using the “upper arrow” or “down arrow” keys to scroll through the available values, and pressing the <Enter> key to select and advance to the next field. The available values range from 4KB to 128 KB in power of 2 increments. The strip size should be chosen based on the planned drive usage. Here are some typical values: RAID0 -128KB / RAID10 - 64KB / RAID5 - 64KB. This field will become available according to the selected RAID level.
5. Then select the capacity of the volume in the Capacity field. The default value is the maximum volume capacity of the selected disks.


[CREATE VOLUME MENU]
Name : Volume0
RAID Level : RAID1(Mirror)
Disks : Select Disks
Strip Size : N / A
Capacity : XXX.X GB
Sync : N / A
Create Volume
[HELP]
The default value indicates the maximum capacity using the selected disks. Entering a lower capacity allows you to create a second volume on these disks.
[↑↓] - Change
[TAB] - Next
[ESC] - Previous Menu
[ENTER] - Select

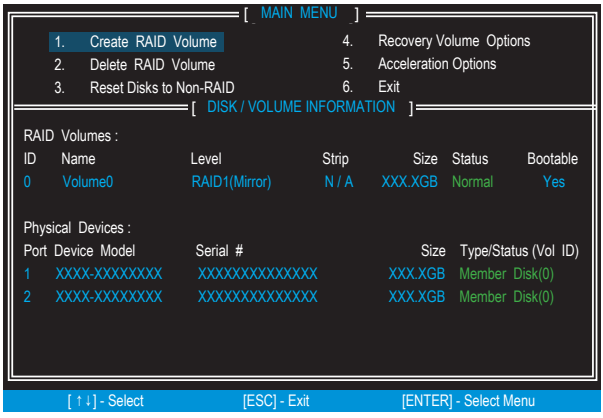
Important

Since you want to create two volumes, this default size (maximum) needs to be reduced. Type in a new size for the first volume. As an example: if you want the first volume to span the first half of the two disks, re-type the size to be half of what is shown by default. The second volume, when created, will automatically span the remainder of two hard drives.

6. Go to the Create Volume field and press <Enter>, the following screen appears for you to confirm if you are sure to create the RAID volume. Press <Y> to continue.


[CREATE VOLUME MENU]
Name : Volume0
RAID Level : RAID1(Mirror)
Disks : Select Disks
Strip Size : N / A
Capacity : XXX.X GB
Sync : N / A
WARNING : ALL DATA ON SELECTED DISKS WILL BE LOST.
Are you sure you want to create this volume? (Y / N) :
Press ENTER to create the specified volume.
[↑ ↓] - Change
[TAB] - Next
[ESC] - Previous Menu
[ENTER] - Select

7. Then the following screen appears to indicate that the creation is finished.


[MAIN MENU]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Recovery Volume Options
5. Acceleration Options
6. Exit
[DISK / VOLUME INFORMATION]
RAID Volumes :
ID Name Level Strip Size Status Bootable
0 Volume0 RAID1(Mirror) N / A XXX.XGB Normal Yes
Physical Devices :
Port Device Model Serial # Size Type/Status (Vol ID)
1 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB Member Disk(0)
2 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB Member Disk(0)
[↑ ↓] - Select
[ESC] - Exit
[ENTER] - Select Menu

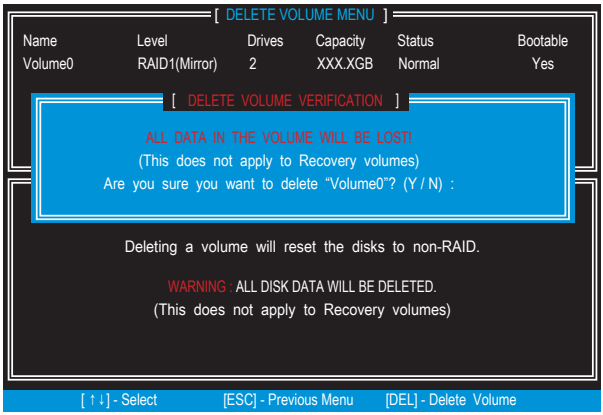
- **Delete RAID Volume**

  Here you can delete the RAID volume, but please be noted that all data on RAID drives will be lost.

Important

If your system currently boots to RAID and you delete the RAID volume in the Intel RAID Option ROM, your system will become un-bootable.

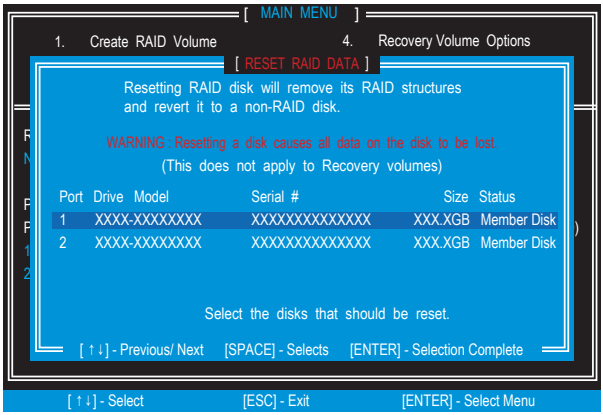
Select option 2 **Delete RAID Volume** from the main menu screen and press <Enter> key to select a RAID volume for deletion. Then press <Delete> key to delete the selected RAID volume. The following screen appears.



Press <Y> key to accept the volume deletion.

- **Reset Disks to Non-RAID**

  Select option 3 Reset Disks to Non-RAID and press <Enter> to delete the RAID volume and remove any RAID structures from the drives. The following screen appears:


[MAIN MENU]
1. Create RAID Volume
4. Recovery Volume Options
[RESET RAID DATA]
Resetting RAID disk will remove its RAID structures
and revert it to a non-RAID disk.
WARNING: Resetting a disk causes all data on the disk to be lost.
(This does not apply to Recovery volumes)
Port Drive Model Serial # Size Status
1 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB Member Disk
2 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB Member Disk
Select the disks that should be reset.
[↑↓] - Previous/ Next [SPACE] - Selects [ENTER] - Selection Complete
[↑↓] - Select [ESC] - Exit [ENTER] - Select Menu

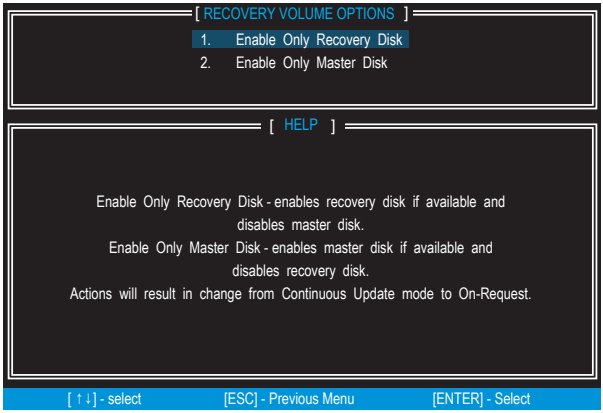
  Use the <Space> key to select the disks and press <Enter> key. A confirmation sentence will appear below, and then press <Y> key to accept the selection.

Important

- *You will lose all data on the RAID drives and any internal RAID structures when you perform this operation.*
- *Possible reasons to "Reset Disks to Non-RAID" could include issues such as incompatible RAID configurations or a failed volume or failed disk.*

- **Recovery Volume Options**

  Select option 4 Recovery Volume Options and press <Enter> to change recovery volume mode. The following screen appears:


[RECOVERY VOLUME OPTIONS]
1. Enable Only Recovery Disk
2. Enable Only Master Disk
[HELP]
Enable Only Recovery Disk - enables recovery disk if available and disables master disk.
Enable Only Master Disk - enables master disk if available and disables recovery disk.
Actions will result in change from Continuous Update mode to On-Request.
[↑↓] - select
[ESC] - Previous Menu
[ENTER] - Select

Recovery mode will change from Continuous Update to On-Request after you enable “Only Recovery Disk” or “Only Master Disk”.

Installing Driver

■ New Windows 7/ Windows Vista / Windows XP Installation

The following details the installation of the drivers while installing operating system.

1. When you start installing Windows XP, you may encounter a message stating, "Setup could not determine the type of one or more mass storage devices installed in your system". If this is the case, then you are already in the right place and are ready to supply the driver. If this is not the case, then press F6 when prompted at the beginning of Windows setup.
2. Press the "S" key to select "Specify Additional Device".
3. You should be prompted to insert a floppy disk containing the Intel® RAID driver into the A: drive.
   Note: For Windows XP, you can use the USB floppy drive only.
   For Windows Vista/ Windows 7 you can use CD/ DVD/ USB drive.

Important

Please follow the instruction below to make an "Intel® RAID Driver" for yourself.

- *Insert the MSI DVD into the DVD-ROM drive.*
- *Click the "Browse CD" on the Setup screen.*
- *Copy all the contents in \\Storage\Intel\PCH\f6flpy-x86 or f6flpy-x64 to a formatted floppy diskette.*
- *The driver diskette for Intel® RAID Controller is done.*

4. For Windows Vista/ Windows 7:
   During the Operating system installation, after selecting the location to install Vista / Windows 7 click on "Load Driver" button to install a third party SCSI or RAID driver.
5. When prompted, insert the floppy disk or media (CD/DVD or USB) you created in step 3 and press Enter.
6. You should be shown a list of available SCSI Adapters.
7. Select the appropriate Intel RAID controller and press ENTER.
8. The next screen should confirm that you have selected the Intel® RAID controller. Press ENTER again to continue.
9. You have successfully installed the Intel® Rapid Storage Technology driver, and Windows setup should continue.
10. Leave the disk in the floppy drive until the system reboots itself. Windows setup will need to copy the files from the floppy again after the RAID volume is formatted, and Windows setup starts copying files.

■ Existing Windows Driver Installation

1. Insert the MSI DVD into the DVD-ROM drive.
2. The DVD will auto-run and the setup screen will appear.
3. Under the Driver tab, click on Intel RAID Drivers.
4. The drivers will be automatically installed.

■ Confirming Windows Driver Installation

1. From Windows, open the Control Panel from My Computer followed by the System icon.
2. Choose the Hardware tab, then click the Device Manager tab.
3. Click the “+” in front of the SCSI and RAID Controllers hardware type. The driver Intel(R) SATA RAID Controller should appear.

Degraded RAID Array

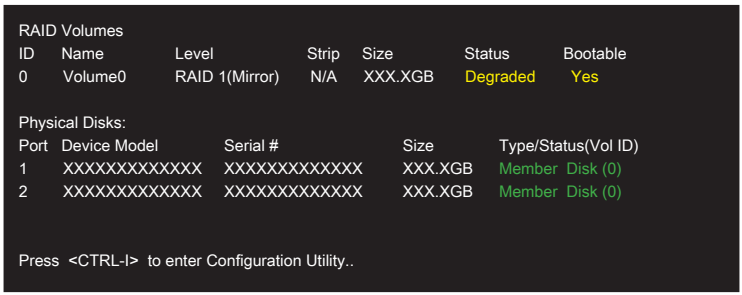
A RAID 1, RAID 5 or RAID 10 volume is reported as degraded when one of its hard drive members fails or is temporarily disconnected, and data mirroring is lost. As a result, the system can only utilize the remaining functional hard drive member. To re-establish data mirroring and restore data redundancy, refer to the procedure below that corresponds to the current situation.

Missing Hard Drive Member

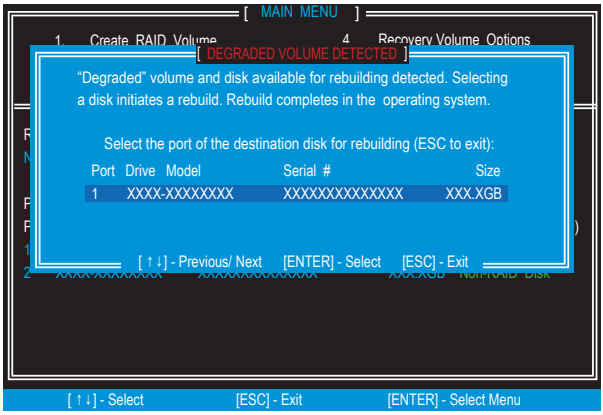
1. Make sure the system is powered off.
2. Reconnect the hard drive.
3. Reboot the system to Windows; the rebuild will occur automatically.

Failed Hard Drive Member

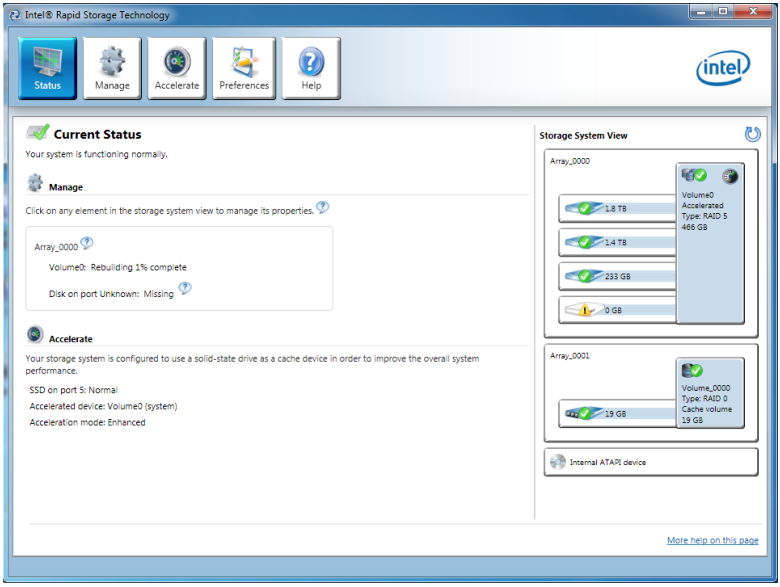
1. Make sure the system is powered off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Reboot the system to Intel RAID Option ROM by press <Ctrl> and <I> keys simultaneously during the Power-On Self Test (POST).


RAID Volumes
ID Name Level Strip Size Status Bootable
0 Volume0 RAID 1(Mirror) N/A XXX.XGB Degraded Yes
Physical Disks:
Port Device Model Serial # Size Type/Status(Vol ID)
1 XXXXXXXXXXXX XXXXXXXXXXXX XXX.XGB Member Disk (0)
2 XXXXXXXXXXXX XXXXXXXXXXXX XXX.XGB Member Disk (0)
Press <CTRL-I> to enter Configuration Utility..

4. Select the port of the destination disk for rebuilding, and then press ENTER.


[MAIN MENU]
1 Create RAID Volume
4 Recovery Volume Options
[DEGRADED VOLUME DETECTED]
"Degraded" volume and disk available for rebuilding detected. Selecting a disk initiates a rebuild. Rebuild completes in the operating system.
Select the port of the destination disk for rebuilding (ESC to exit):
Port Drive Model Serial # Size
1 XXXX-XXXXXXXX XXXXXXXXXXXXXX XXX.XGB
[↑ ↓] - Previous/ Next [ENTER] - Select [ESC] - Exit
[↑ ↓] - Select [ESC] - Exit [ENTER] - Select Menu

5. Exit Intel RAID Option ROM, and then reboot to Windows system.
6. When prompted to rebuild the RAID volume, click 'Yes'.
7. The Intel Rapid Storage Technology application will be launched. Right-click the new hard drive and select 'Rebuild to this Disk'. The 'Rebuild Wizard' will be launched which will guide you through the process of rebuilding to the new hard drive.



System Acceleration

Intel® Rapid Storage Technology use a SSD as a cache. Which can store frequently used data without having to use a slow virtual disk or depend on RAM. The SSD cache with the advantages of high-speed read/write and non-volatile memory to accelerate the system performance.

Important

Check your SSD manufacturer's website, upgrade firmware in order to support Intel® Rapid Storage Technology.

Intel® Rapid Storage Technology can only work with RAID mode. Even though there is only one hard drive, you must set the SATA Mode to RAID in BIOS. The OS must be installed in the RAID ready disk in order to use the SSD caching.

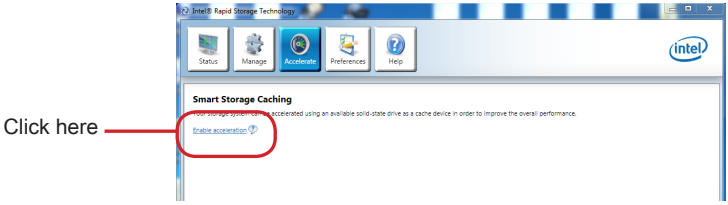
Follow these steps to enable system acceleration. If Windows has been installed in RAID mode, skip to the step 5.

1. Reboot and enter the BIOS steup.
2. Set the SATA Mode to RAID in BIOS.
3. Install Intel® RAID controller driver. Please refer to the section "Installing Driver".
4. Install Windows operating system.
5. Powered off.
6. Connect the SSD.
7. Reboot the system to Windows.
8. Insert the MSI DVD into the DVD-ROM drive.

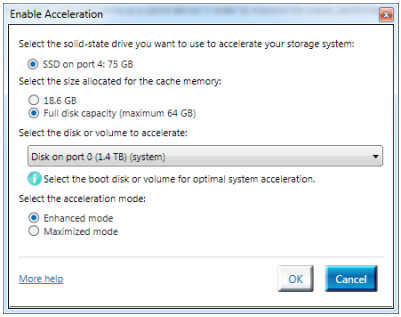
9. Click the “STORAGE” on the Setup screen.

10. Click the "Intel RAID Driver" to install Intel® Rapid Storage Technology application.

11. Run Intel® Rapid Storage Technology application.
12. Click "Enable acceleration" under Accelerate.



13. Select the acceleration options.

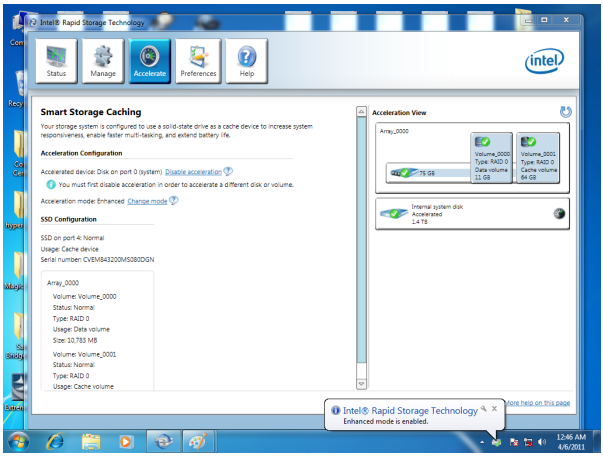

Enable Acceleration
Select the solid-state drive you want to use to accelerate your storage system:
SSD on port 4: 75 GB
Select the size allocated for the cache memory:
18.6 GB
Full disk capacity (maximum 64 GB)
Select the disk or volume to accelerate:
Disk on port 0 (1.4 TB) (system)
Select the boot disk or volume for optimal system acceleration.
Select the acceleration mode:
Enhanced mode
Maximized mode
More help
OK
Cancel

14. Click OK and reboot the system.

The page refreshes and reports the new acceleration configuration in the Acceleration View.

Important

You can click "More help on this page" or "More help" of the Intel® Rapid Storage Technology application to view more information.

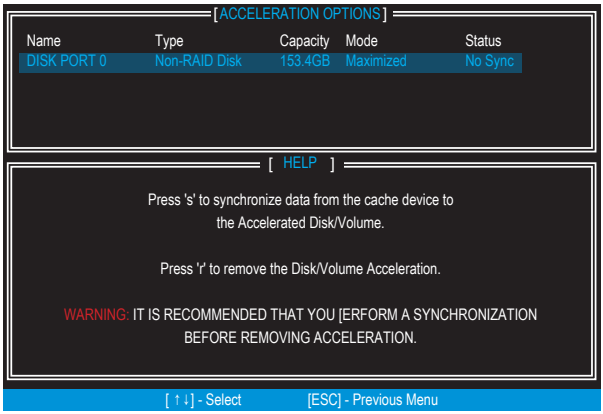


RST Synchronization

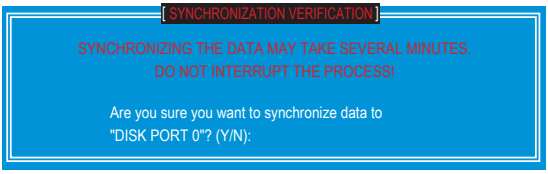
If you are using Maximized mode as the Acceleration mode, the data on the hard disk is not always synchronized with the data in the SSD cache. In some situations, you may want to manually sync the disks for avoiding data loss.

Follow these steps to sync manually.

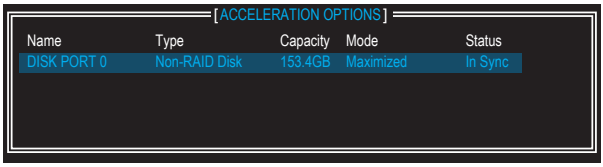
1. Reboot system, during the Power-On Self Test (POST) press, press <Ctrl> and <I> keys simultaneously to enter the Intel Rapid Storage Technology Option ROM.
2. Select option 5 “Acceleration Options” and press <Enter> key. The following screen appears.



3. Press <S> to synchronize data.


[SYNCHRONIZATION VERIFICATION]
SYNCHRONIZING THE DATA MAY TAKE SEVERAL MINUTES
DO NOT INTERRUPT THE PROCESS!
Are you sure you want to synchronize data to "DISK PORT 0"? (Y/N):

4. When prompted, press <Y> to confirm.



5. Once synchronization is complete, the status will change to In Sync.